SONY

HD TRINITRON® COLOR MONITOR

HDM-2830
HDM-2830E

Chassis No.SCC-C78A-A(HDM-2830)
Chassis No.SCC-C52A-A(HDM-2830E)

HDVS

OPERATION AND MAINTENANCE MANUAL
2nd Edition
Serial No. 2100001 and Higher (HDM-2830)
Serial No. 2100001 and Higher (HDM-2830E)

Warning—This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

Important—To insure that the complete system (including this peripheral) is capable of complying with the FCC requirements, it is recommended that the user make sure that the individual equipment of the complete system has a label with one of the following statements.
"This equipment has been tested with a Class A Computing Device and has been found to comply with Part 15 of FCC rules."
—or—
"This equipment complies with the requirements in Part 15 of FCC rules for a Class A Computing Device."
—or equivalent.

This apparatus complies with the Class A limits for radio noise emissions set out in Radio Interference Regulations of CANADA.

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CAUTION!!

DO NOT USE THE EXTERNAL DEGAUSSER TO DEMAGNETIZE THE SCREEN.
BE SURE TO USE THE DEGAUSS SWITCH ON THE FRONT PANEL.

ATTENTION AU COMPOSANT AYANT RAPPORT A LA SÉCURITÉ!!

LES COMPOSANTS IDENTIFIÉS PAR UN TRAMÉ ET UNE MARQUE ⚠ SUR LES DIAGRAMMES SCHÉMATIQUES, LES VUES EXPLOSÉES ET LA LISTE DES PIÈCES SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNEMENT. NE REMPLACER CES COMPOSANTS QUE PAR DES PIÈCES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DES SUPPLÉMENTS PUBLIÉS PAR SONY. LES RÉGLAGES DU CIRCUIT QUI SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNMENT SONT IDENTIFIÉS DANS CE MANUEL. SUIVRE LES PROCÉDURES QUAND LES COMPOSANTS CRITIQUES SONT REMPLACÉS OU LE FONCTIONNEMENT IMPROPRE EST SUSPECTÉ.

ATTENTION!!

NE PAS UTILISER DE DÉMAGNÉTISEUR EXTÉRITUR POUR DÉMAGNÉTISER L'ÉCRAN.
UTILISER LA TOUCH DE DÉMAGNÉTISATION (DEGAUSS) SUR LE PANNEAU FRONTAL.

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SECTION 1 OPERATION

1-1. Overview

The HDM-2830/2830E is a 28-inch color video monitor for the high definition video systems which conform to the BTA/SMPTE standard.

Adaptable to a variety of input signal format

BTA/SMPTE standard

The monitor has a 16:9 aspect ratio and uses the tri-level bipolar sync, which conforms to the BTA/SMPTE standard, and can receive the BTA S-001/SMPTE 240M standard $Y/P_B/P_R$ signal or GBR signal.

Other input signal formats

Besides the BTA/SMPTE standard signal, the monitor can receive the original HDVS format signal* and 525-line-non-interlaced signal (IDTV decoder output).

Two sets of input connectors

The monitor is supplied with two input channels, A and B. You can select either one with the INPUT selector.

High quality picture

Flat and square screen

The monitor employs a Super Fine Pitch Trinitron picture tube whose surface is almost flat (the radius of the curvature is 2,000 mm.) and which has a squarely cornered screen, which provides a clear picture on the entire screen.

High picture resolution

The Super Fine Pitch Trinitron picture tube, which has a 0.35 mm phosphor trio pitch, realizes more than 1,000 TV lines of horizontal resolution.

High contrast with less reflected light

A gray panel and AR (anti-reflection) coating on tube face absorb most of the ambient light, and give an excellent picture contrast.

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* RGB signal with a 5:3 aspect ratio
(When the original HDVS format signal is input, small pedestal areas (black areas) appear on the right and left of an HD picture.)

Multiple adjustment functions

Sub-control panel in the drawer

The controls are located in the sub-control panel in the drawer, and you can access them easily by pulling out the drawer. On the sub-control panel, there are an aperture control, input mode selector, contrast and brightness preset controls, convergence control, color temperature control, and other controls to adjust the picture.

Seven types of test signals

The built-in test signal generator generates seven test signals; crosshatch, inverted double hatch, flat field, set up, gray scale, dot and PLUGE* signals, for checking the monitor.

Convergence adjustment

The digital convergence adjustment circuitry makes fine and easy convergence adjustment possible over all the screen.

Advanced adjustment circuitry

Beam landing adjustment

You can easily make adjustment with the beam landing adjustment circuitry if the beam landing is affected by horizontal terrestrial magnetism, when you install the monitor.

Aperture compensation

The aperture adjustment circuitry adjusts only the Y signal decoded from a $Y/P_B/P_R$ signal or a GBR signal.

Stable color temperature

Both the beam detector and the pulse adder control the black level, brightness and contrast to keep the color temperature stable for a long time.

Excellent focus characteristics

The electrostatic convergence adjustment circuit, and horizontal and vertical dynamic focus circuit provide an optimum focus over the entire screen.

* PLUGE=Picture Line Up Generating Equipment

Others

Internal or external sync signal which is selectable

You can use the internal sync signal or an external sync signal fed to the EXT SYNC connector, by selecting either one with the SYNC selector. If horizontal and vertical sync signals are fed to the HD and VD connectors respectively, these signals will be selected.

Sync signal display

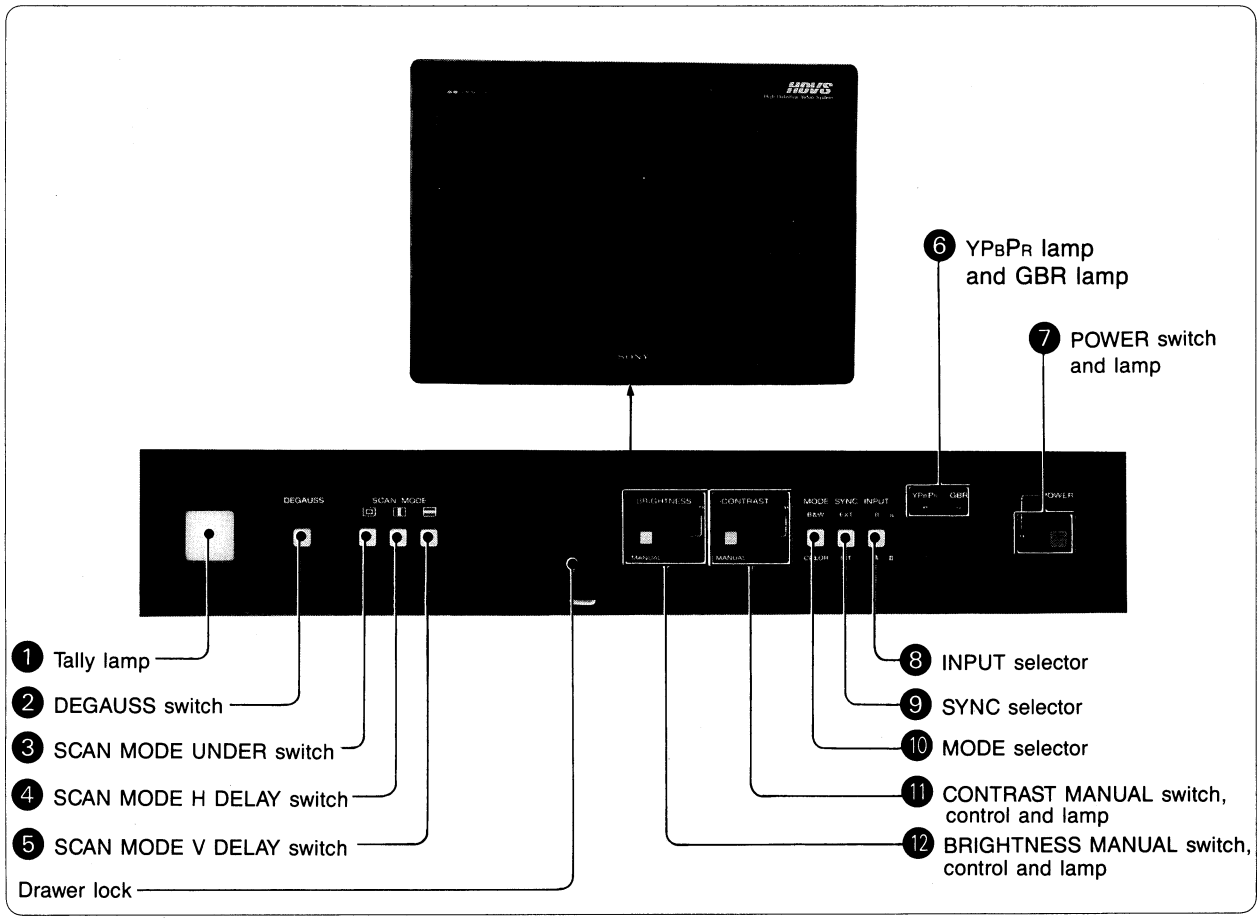
When you press the H delay switch, the horizontal sync signal appears at 1/4 of the screen width from the left of the screen, and when you press the V delay switch, the vertical sync signal appears in the center. To monitor both signals as pulse-cross signal, press both buttons.

Attaching an optional monitor hood

An optional VF-503 monitor hood can be attached to eliminate light reflection on the screen.

1-2. Location and Functions of Parts and Controls

1-2-1. Front Panel



1 Tally lamp

When the TALLY switch on the sub-control panel is set to ON, this lamp lights while the power of the monitor is on. When the TALLY switch is set to OFF, this lamp does not light.

Open the drawer and insert the supplied number plate of choice.

2 DEGAUSS switch

Press this switch with the unit on to demagnetize the picture tube. This switch does not operate when pressed again right after degaussing has been made. Wait for more than five minutes to use the switch again.

3 SCAN MODE UNDER (underscan) switch

Press this switch for 3% underscanning. The display size is reduced by approximately 8% and the signal normally scanned outside of the screen is displayed on the screen. To resume normal scanning, press the switch again.

4 SCAN MODE H DELAY switch

Press this switch to monitor the horizontal sync signal. The picture moves right and the sync signal appears at 1/4 of the screen width from the left of the screen. At this time, the pedestal of the picture increases. Press the switch again to place the picture in the normal position.

❺ SCAN MODE V DELAY switch
Press this switch to monitor the vertical sync signal. The picture moves down and the sync signal appears in the center of the screen. At this time, the pedestal of the picture increases. Press the switch again to place the picture in the normal position.

- When you press both the SCAN MODE V DELAY and SCAN MODE H DELAY switches, the picture displays pulse-cross.

❻ YP_BP_R lamp and GBR lamp
The appropriate lamp lights to indicate the mode selected on the JA board when the A or B input is selected by the INPUT selector ❽.

❼ POWER switch and lamp
Press to turn on the unit. When power is turned on, the lamp lights and the automatic degaussing circuit is activated to demagnetize the picture tube. The picture will not be stable for about 5 seconds until demagnetization is completed.

❽ INPUT selector
⎍ **A:** To monitor the signal fed to the INPUT A connectors.
⎓ **B:** To monitor the signal fed to the INPUT B connectors.

❾ SYNC selector
⎍ **INT:** To use the composite sync signal supplied with the G signal of the GBR signal, or with the Y signal of the $Y/P_B/P_R$ signal.
⎓ **EXT:** To use an external sync signal fed to the EXT SYNC connector.
The HD and VD signals, if they are supplied to the HD and VD connectors, have priority over the other two sync signals regardless of the switch setting.

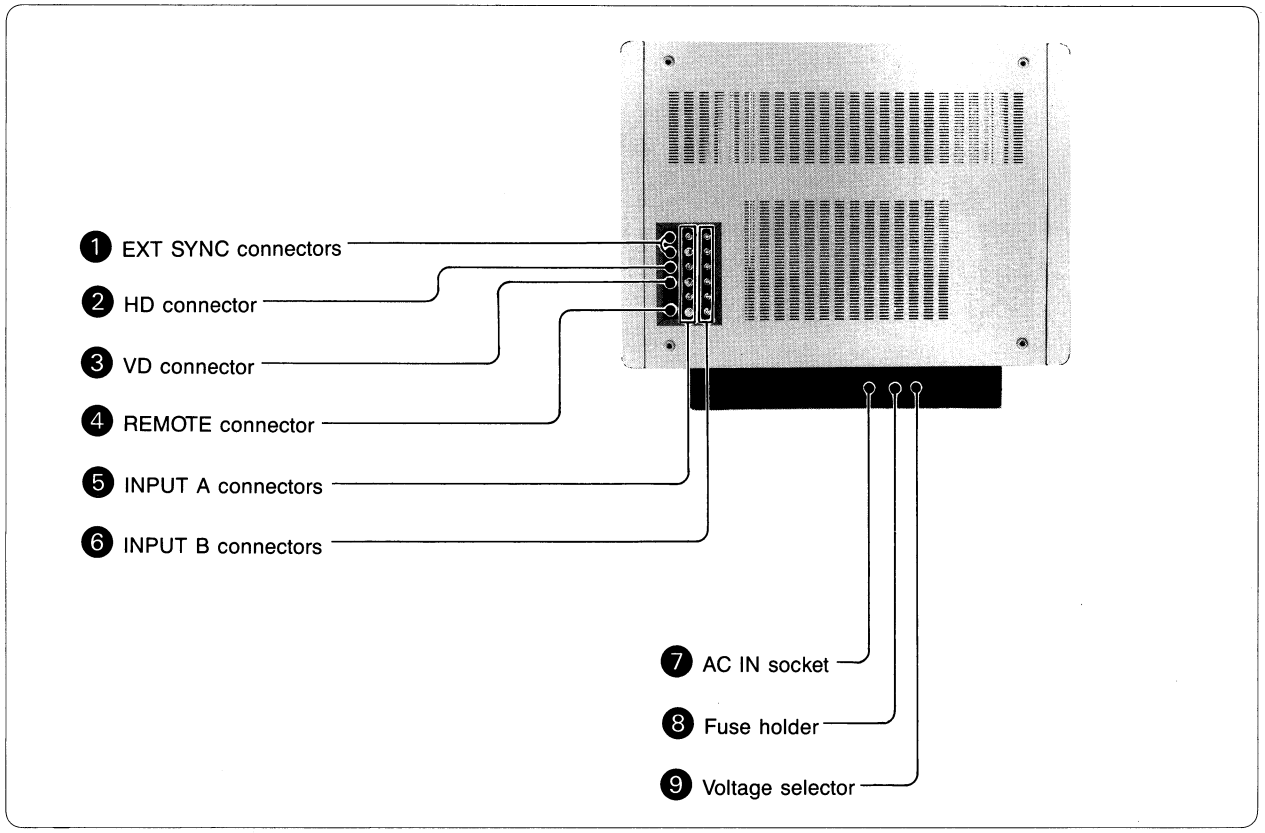
❿ MODE selector
⎍ **COLOR:** To use the monitor in color mode. Normally select this setting.
⎓ **B & W:** To set the monitor to black and white operation.

⓫ CONTRAST MANUAL switch, control and lamp
Press the switch (the lamp lights) and turn the control to adjust the contrast of the picture. When the lamp is not lit, the contrast level is set to the preset value which has been set by the PRESET CONTRAST control on the JA board.

⓬ BRIGHTNESS MANUAL switch, control and lamp
Press the switch (the lamp lights) and turn the control to adjust the brightness of the picture. When the lamp is not lit, the brightness level is set to the preset value which has been set by the PRESET BRIGHT control on the JA board.

⎍ indicates that the switch is not depressed and
⎓ indicates that it is depressed.

1-2-2. Rear Panel



1 EXT (external) SYNC connectors (BNC)
External sync signal (composite) input. One of the two connectors is used for a bridging connection. If you do not use it, attach the supplied 75-ohm termination plug.

2 HD (horizontal drive) connector (BNC)
External horizontal sync signal input. (The input signal is terminated with 75-ohms inside.)

3 VD (vertical drive) connector (BNC)
External vertical sync signal input. (The input signal is terminated with 75-ohms inside.)

4 REMOTE connector (10 pin)

Pin No.	Signal		Pin No.	Signal
	OPEN	GND		
1	COLOR	B & W	6	GND
2	INPUT A	B	7	—
3	TALLY OFF	ON	8	—
4	SYNC INT	EXT	9	—
5	LOCAL	REMOTE	10	—

When you use the connector, set pin No.5 & 6 to GND, and the pin corresponding to your desired mode to OPEN or GND.
For example, when you change the monitor to the B&W mode, set pin No.1 to GND.
If you set No.5 to GND, the remote control operation has priority over the setting of the selectors on the front panel and sub-control panel.

❺ **INPUT A connectors** (BNC)

❻ **INPUT B connectors** (BNC)
HDVS signals or 525-line-non-interlaced signals may be used. Set the switches on the JA board according to the format of the input signals. (Refer to "1-4. Setting Switches according to the Input Signals".) To select which input signals, A or B, to monitor, press the INPUT select button on the front panel.
Each input has a connector for a bridging connection. If you do not use the connector for the bridging connection, attach the supplied 75-ohm termination plug.

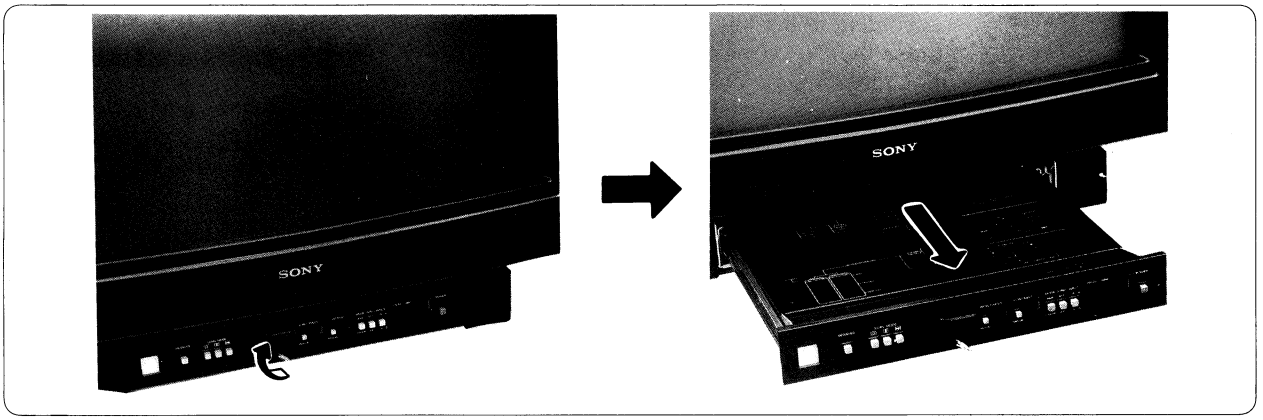
❼ **AC IN socket**
Connect the supplied AC power cord.

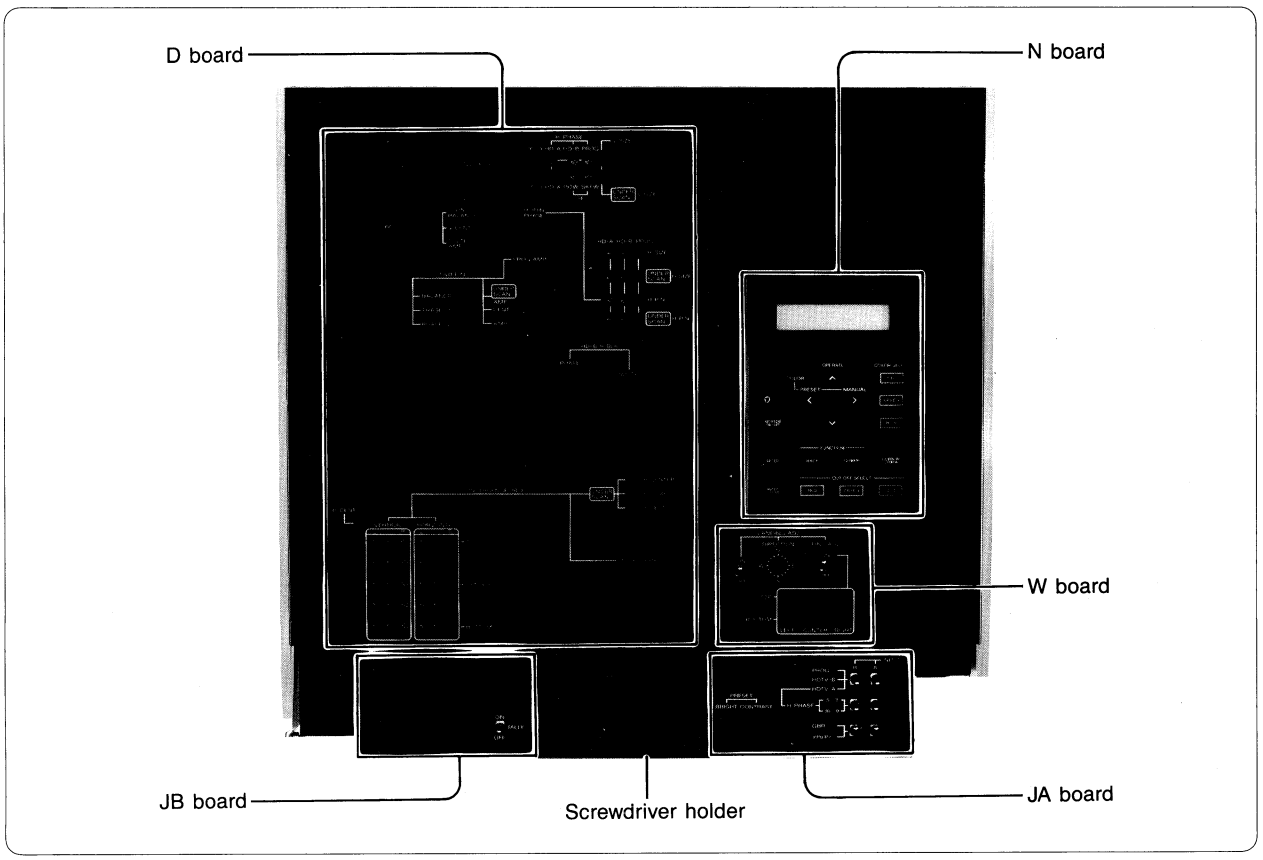
❽ **Fuse holder**
Use a 6.3A fuse for operation on 100 – 120V AC, or a T4A fuse for operation on 220 – 240V AC.

❾ **Voltage selector**
Set to the local power line voltage, 100 – 120V AC or 220 – 240V AC.

1-2-3. Sub-Control Panel

Insert the supplied key into the drawer keyhole, turn it 90° clockwise and pull the drawer out.





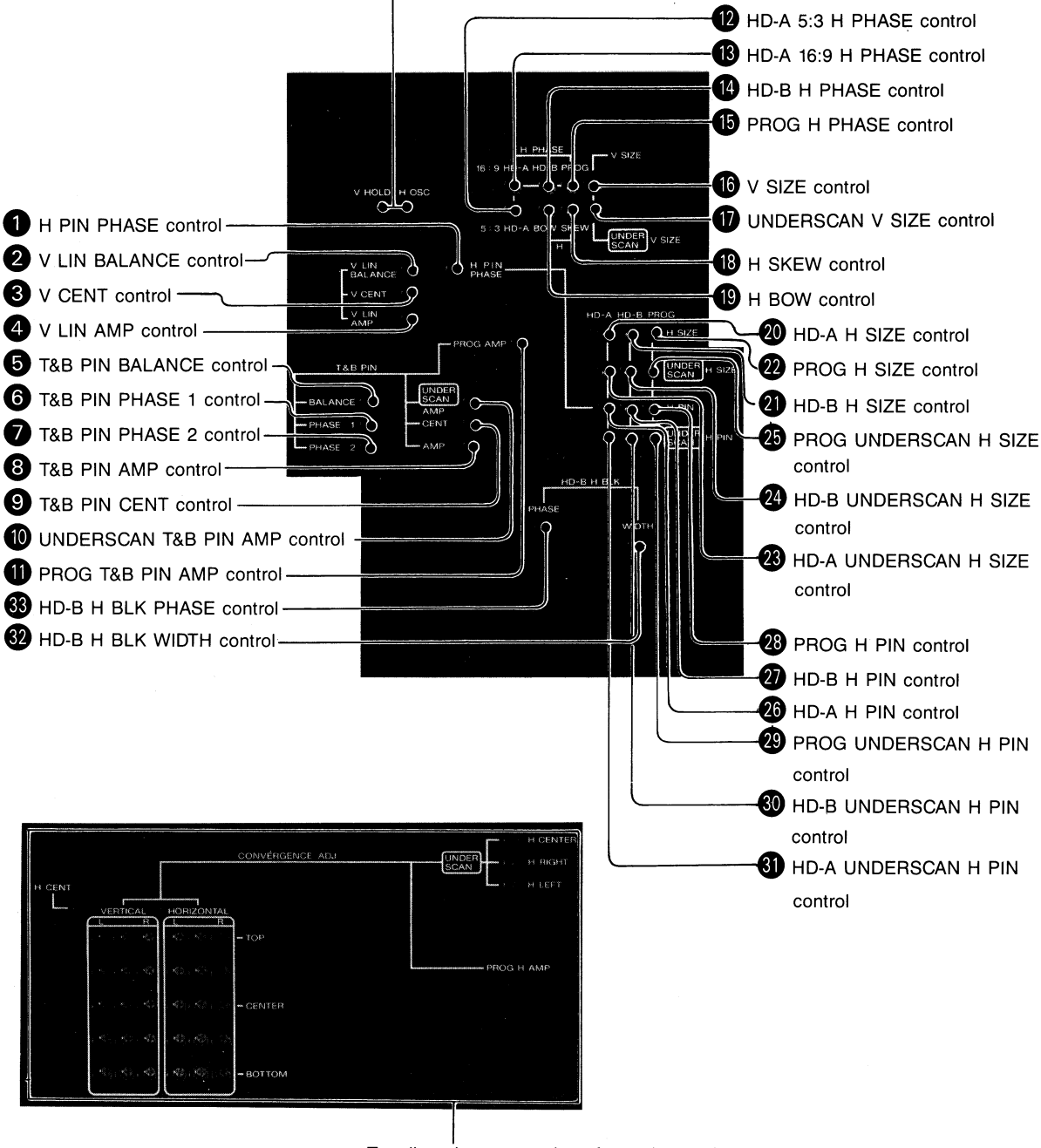
Note

To adjust the unit with the controls on the sub-control panel, wait for more than 30 minutes after the power is turned on to fully warm up the unit.

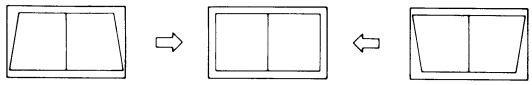
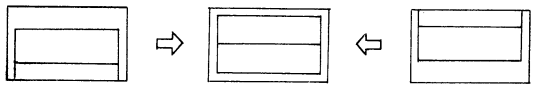
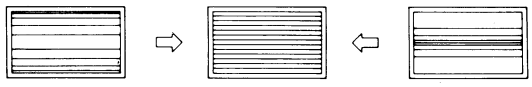
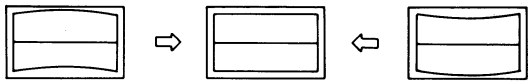
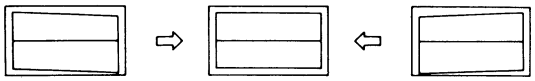
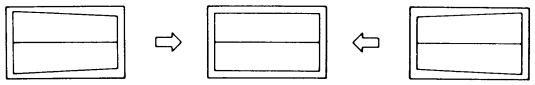
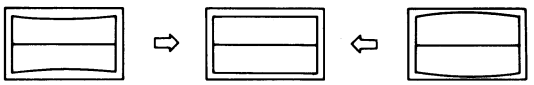
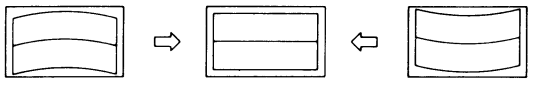
To adjust the controls, use the supplied screwdriver stored in the screwdriver holder on the panel.

D board (Geometry distortion correction)

To adjust these controls, refer to the section on electrical adjustment in Section 4.

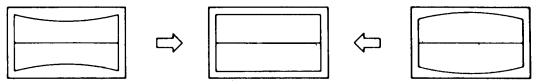


To adjust these controls, refer to the section on convergence adjustment in Section 4.

❶	**H PIN (horizontal pincushion) PHASE control** Adjusts the phase of the pincushion distortion at the sides.	
❷	**V LIN (vertical linearity) BALANCE control** Adjusts the vertical linearity balance of the picture.	
❸	**V CENT (vertical centering) control** Adjusts the vertical position of the picture.	
❹	**V LIN (vertical linearity) AMP control** Adjusts the vertical linearity of the picture.	
❺	**T&B PIN (top & bottom pincushion) BALANCE control** Adjusts the phase of the pincushion distortion at the top and bottom.	
❻	**T&B PIN (top & bottom pincushion) PHASE 1 control** Adjusts the phase of the pincushion distortion at the top and bottom.	
❼	**T&B PIN (top & bottom pincushion) PHASE 2 control** Adjusts the phase of the pincushion distortion at the top and bottom.	
❽	**T&B PIN (top & bottom pincushion) AMP control** Adjusts the amplitude of the pincushion distortion at the top and bottom.	
❾	**T&B PIN CENT (top & bottom pincushion centering) control** Adjusts the pincushion distortion at the center of the screen.	

⑩ UNDERSCAN T&B PIN (underscan top and bottom pincushion) AMP control

Adjusts the amplitude of the top and bottom pincushion distortion of the underscanned picture. Adjust this control after adjustment with the T & B PIN AMP control ⑧.



⑪ PROG T&B PIN (progressive scan top & bottom pincushion) AMP control

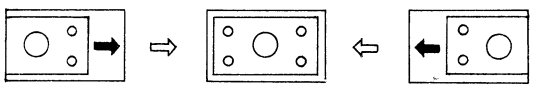
Adjusts the pincushion distortion at the top and bottom when you set the INPUT A/B system selector on the JA board to PROG. Adjust this control after adjusting the T&B PIN AMP control ⑧.

⑫ HD-A 5:3 H (HDTV-A original format horizontal) PHASE control

Adjusts the horizontal phase of the input signal when you set the INPUT A/B system selector to HDTV-A and the INPUT A/B H PHASE selector to 5:3 on the JA board.

Note

This control does not operate when you are monitoring the internal test signal with the INPUT A/B system selector set to HDTV-A. The format of the internal test signal is the new HDVS format and the phase can be adjusted with the HD-A 16:9 H PHASE control regardless of the INPUT A/B H PHASE selector setting.



⑬ HD-A 16:9 H (HDTV-A new format horizontal) PHASE control

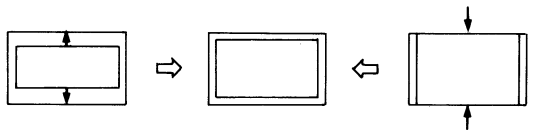
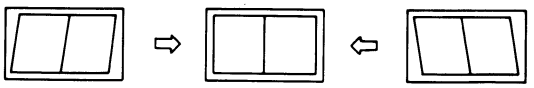
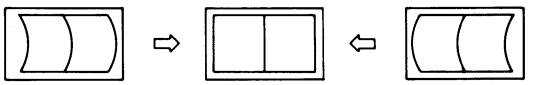
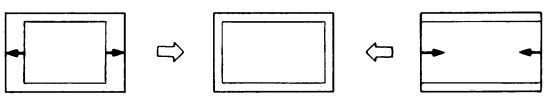
Adjusts the horizontal phase of the input signal when you set the INPUT A/B system selector on the JA board to HDTV-A and the INPUT A/B H PHASE selector to 16:9 on the JA board.

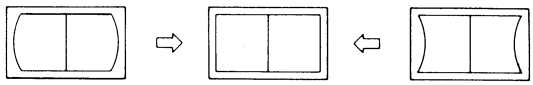
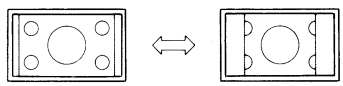
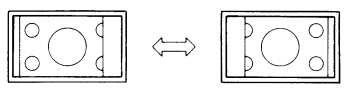
⑭ HD-B H (HDTV-B horizontal) PHASE control

Adjusts the horizontal phase of the input signal when you set the INPUT A/B system selector to HDTV-B.

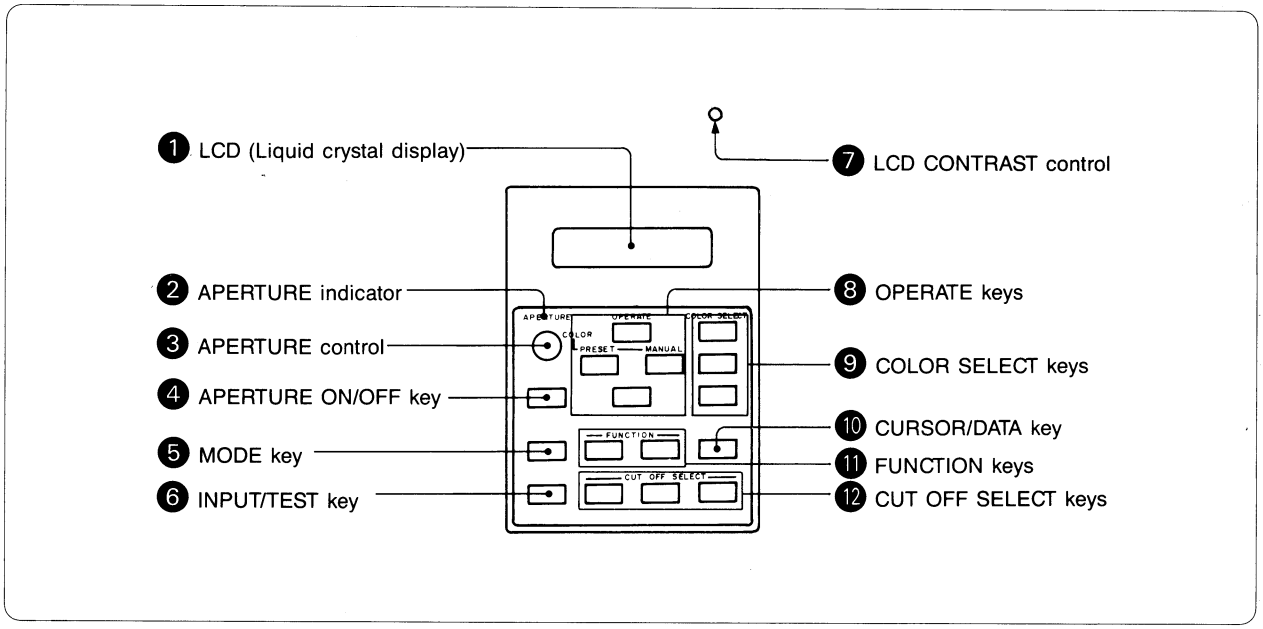
⑮ PROG H (progressive scan horizontal) PHASE control

Adjusts the horizontal phase of the input signal when you set the INPUT A/B system selector to PROG.

⑯	**V SIZE (vertical size) control** Adjusts the vertical size of the picture.	
⑰	**UNDERSCAN V SIZE (vertical size) control** Adjusts the vertical size of the underscanned picture.	
⑱	**H SKEW (horizontal skew) control** Adjusts the skew of the picture.	
⑲	**H BOW (horizontal bow) control** Adjusts the bow of the picture.	
⑳	**HD-A H SIZE (HDTV-A horizontal size) control** Adjusts the horizontal size of the picture when you set the INPUT A/B system selector to HDTV-A.	
㉑	**HD-B H SIZE (HDTV-B horizontal size) control** Adjusts the horizontal size of the picture when you set the INPUT A/B system selector to HDTV-B.	
㉒	**PROG H SIZE (progressive scan horizontal size) control** Adjusts the horizontal size of the picture when you set the INPUT A/B system selector to PROG.	
㉓	**HD-A UNDERSCAN H SIZE (HDTV-A underscan horizontal size) control** Adjusts the width of the picture when you set the INPUT A/B system selector to HDTV-A and SCAN MODE UNDER switch to ON.	
㉔	**HD-B UNDERSCAN H SIZE (HDTV-B underscan horizontal size) control** Adjusts the width of the picture when you set the INPUT A/B system selector to HDTV-B and SCAN MODE UNDER switch to ON.	
㉕	**PROG UNDERSCAN H SIZE (progressive scan underscan horizontal size) control** Adjusts the width of the picture when you set the INPUT A/B system selector to PROG and SCAN MODE UNDER switch to ON.	

㉖	**HD-A H PIN (HDTV-A horizontal pincushion) control** Adjusts the pincushion distortion at the sides when you set the INPUT A/B system selector to HDTV-A.	
㉗	**HD-B H PIN (HDTV-B horizontal pincushion) control** Adjusts the pincushion distortion at the sides when you set the INPUT A/B system selector to HDTV-B.	
㉘	**PROG H PIN (progressive scan horizontal pincushion) control** Adjusts the pincushion distortion at the sides when you set the INPUT A/B system selector to PROG.	
㉙	**PROG UNDERSCAN H PIN (progressive scan underscan horizontal pincushion) control** Adjusts the pincushion distortion at the sides when you set the INPUT A/B system selector to PROG and SCAN MODE UNDER switch to ON.	
㉚	**HD-B UNDERSCAN H PIN (HDTV-B underscan horizontal pincushion) control** Adjusts the pincushion distortion at the sides when you set the INPUT A/B system selector to HDTV-B and SCAN MODE UNDER switch to ON.	
㉛	**HD-A UNDERSCAN H PIN (HDTV-A underscan horizontal pincushion) control** Adjusts the pincushion distortion at the sides when you set the INPUT A/B system selector to HDTV-A and SCAN MODE UNDER switch to ON.	
㉜	**HD-B H BLK WIDTH (HDTV-B horizontal blanking width) control** Adjusts the width of the horizontal blanking part when you set the INPUT A/B system selector to HDTV-B.	
㉝	**HD-B H BLK PHASE (HDTV-B horizontal blanking phase) control** Adjusts the phase of the horizontal blanking part when you set the INPUT A/B system selector to HDTV-B.	

N board (color temperature and convergence adjustment and internal test signal selection)



1 LCD
The display shows adjustment mode, data and messages to guide key operation.

2 APERTURE indicator
The indicator lights up when the APERTURE ON/OFF key 4 is set to ON and the APERTURE control 3 is activated for aperture compensation.

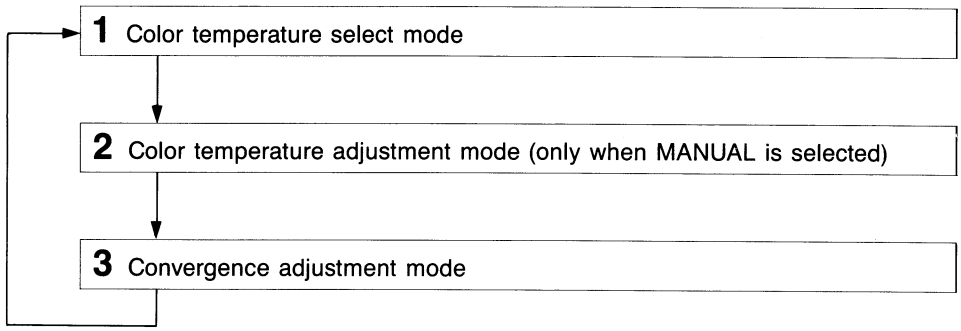
3 APERTURE control
Turn the control for aperture compensation (H detail response). Set the APERTURE ON/OFF key 4 to ON to activate the control.

4 APERTURE ON/OFF key
Set the key to ON and use the APERTURE control 3 for the aperture compensation. When the key is set to OFF, the control does not function and the frequency response of the video amplifiers is flat.

Lamps of the LCD and keys
Any keys that are lit and indicating current operation, as well as the LCD displays, will go off about 5 minutes after the last key is pressed.

❺ MODE key

Press this key to change the adjustment mode. Every time the key is pressed, the mode changes as follows.



❻ INPUT/TEST key

Press the key to select which signal, the internal test signal or the input signal, to display.

Note

If you display an input signal whose sync signal has a different phase from that of the internal test signal, the horizontal position of the picture may shift. In this case, adjust the phase of the input signal with the H PHASE control (⓬ to ⓯ on the D board).

❼ LCD CONTRAST control

Turn the control to adjust the contrast of the LCD.

❽ OPERATE keys

These keys function differently depending on the adjustment mode. Press these keys to adjust the color temperature or convergence in each mode. In the color temperature select mode, press the COLOR PRESET ([<]) key or the COLOR MANUAL key ([>]) to select the preset color temperature or the color temperature which you have adjusted.

❾ COLOR SELECT keys

Press one of these keys to select the color for color temperature adjustment. The selected color is indicated as "G", "B" or "R" on the LCD.

❿ CURSOR/DATA key

Use this key to adjust the convergence.

For coarse adjustment: Every time the key is pressed, the cursor moves to the next adjustment point on the monitor screen. The convergence at the point where the cursor is located can be adjusted with the OPERATE keys.

For fine adjustment: Pressing this key stops the cursor blinking and enables adjustment at the point where the cursor is located. Pressing this key again starts cursor blinking again and enables to move the cursor to a desired position with the OPERATE keys.

⓫ FUNCTION keys

Press the appropriate key to change functions in the color temperature adjustment mode and the convergence adjustment mode, and press the appropriate key to change the test signal being displayed in the test mode.
Pressing the FORWARD key changes the function or the test signal in the following order.

Mode	Function or test signal
Color temperature adjustment	Bias 1 Gain Bias 2
Convergence adjustment	Coarse adjustment Fine adjustment
Test mode	Flat field Setup Gray scale Crosshatch Inverted double-hatch Dot PLUGE*

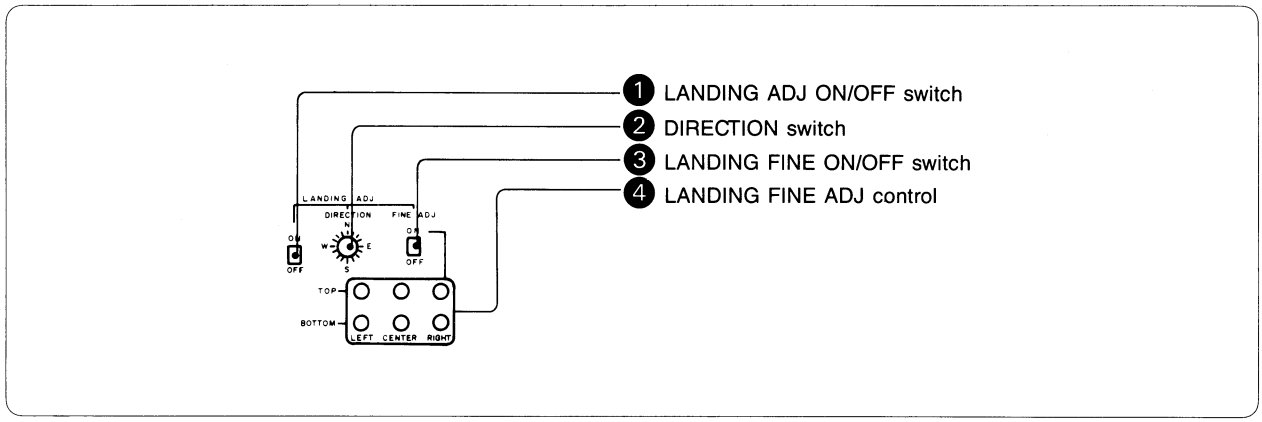
Pressing the BACK key returns the function or the test signal to the previously selected one.

⓬ CUT OFF SELECT keys

Press GREEN, BLUE or RED key to cut the beam of the corresponding color. To monitor single colors for beam landing adjustment, cut off the two other colors by pressing their keys.

* PLUGE=Picture Line Up Generating Equipment

W board (beam landing)



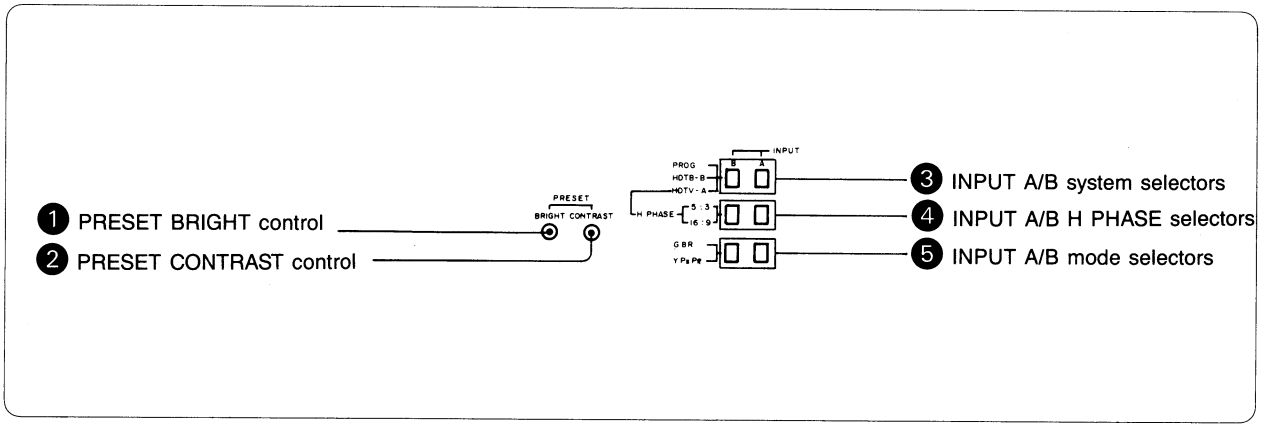
1 LANDING ADJ ON/OFF switch
Set the switch to ON to activate the beam landing (purity) correction circuit and adjust it with the DIRECTION switch 2. Keep the switch to ON after adjustment is over.

2 DIRECTION switch
Turn the switch to correct the beam landing if there is impurity caused by horizontal terrestrial magnetism on the screen. To use this switch, set the LANDING ADJ ON/OFF switch 1 to ON.

3 LANDING FINE ON/OFF switch
Set the switch to ON for fine adjustment of the beam landing with the LANDING FINE ADJ controls 4 when impurity still remains after adjustment with switch 2.

4 LANDING FINE ADJ (adjustment) controls
Turn these controls for fine adjustment of the beam landing. Use the appropriate control which corresponds to the portion on the screen to be adjustd.

JA board (brightness and contrast adjustment and input mode selection)



1 PRESET BRIGHT (brightness) control

Turn the control to preset the picture brightness. The level is set to the preset level when you set the BRIGHTNESS/MANUAL switch on the front panel to OFF.

2 PRESET CONTRAST control

Turn the control to preset the picture contrast. The level is set to the preset level when you set the CONTRAST/MANUAL switch on the front panel to OFF.

3 INPUT A/B system selectors

Set each switch to the appropriate position depending on the system of the input signals fed to the INPUT A or B connector. When you change the setting of the switch, it may take a short time for the monitor to change the picture size, H phase, color temperature and convergence data.

HDTV-A: For the HDTV format input signal. If this position is selected, set the INPUT A/B H PHASE selector 4 to the position (5:3 or 16:9) which is appropriate.
If you select the position of 5:3 and input the original HDVS format signal, pedestal areas (black areas) appear on the right and left of the picture.

HDTV-B: Used to change the setting (picture size, H phase, color temperature and convergence) from HDTV-A. (Factory-setting is HDTV-A.)

PROG (progressive scan): For 525-line-non-interlaced signal (525 lines, 59.94 frames/sec., non-interlace). The aspect ratio is 4:3.

4 INPUT A/B H PHASE selectors

Set the switch to the appropriate position depending on the format of the input signal when the INPUT A/B system selector 3 is set to HDTV-A.

16:9: For the BTA/SMPTE (new) HDTV format

5:3: For the original HDTV format

5 INPUT A/B mode selectors

Set each switch to an appropriate position, GBR or YP_BP_R, depending on the mode of the input signals fed to the INPUT A or B connector. This switch is operative only when you set the INPUT A/B system selector 3 to HDTV-A or HDTV-B. When the switch is set to PROG, the GBR mode is selected regardless of the setting of this switch. The selected mode is indicated by the GBR or YP_BP_R lamp on the front panel.

JB board

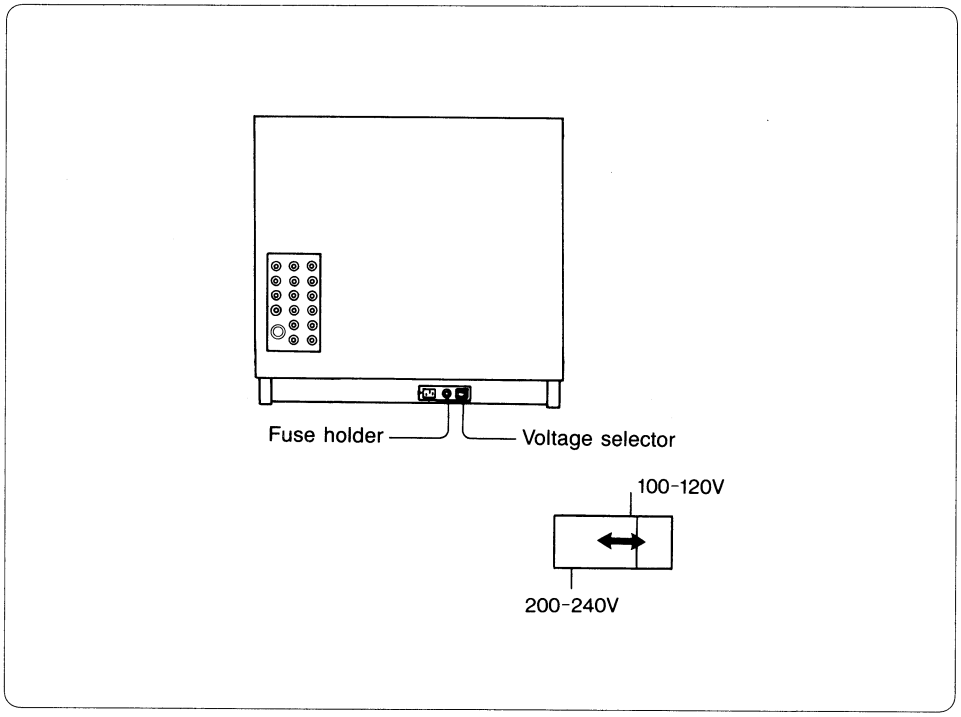
TALLY switch

By setting this switch to ON, the tally lamp on the front panel lights when the power is on. When this switch is set to OFF, the tally lamp will not light.

1-3. Connection and Preparation at Installation

1-3-1. Selecting the Operating Voltage

The HDM-2830/2830E can operate on either 100-120 or 220-240V AC by selecting the operating voltage with the voltage selector. Before plugging in the unit, make sure that the voltage selector is set to the local power line voltage. Change the setting of the voltage selector, if necessary.



NOTICE
THIS NOTICE IS APPLICABLE FOR USA AND CANADA ONLY.
If shipped to USA, use the UL LISTED power cord specified below for 220-240 V operation.
If shipped to CANADA, use the CSA CERTIFIED power cord specified below for 220-240 V operation.

DO NOT USE ANY OTHER POWER CORD

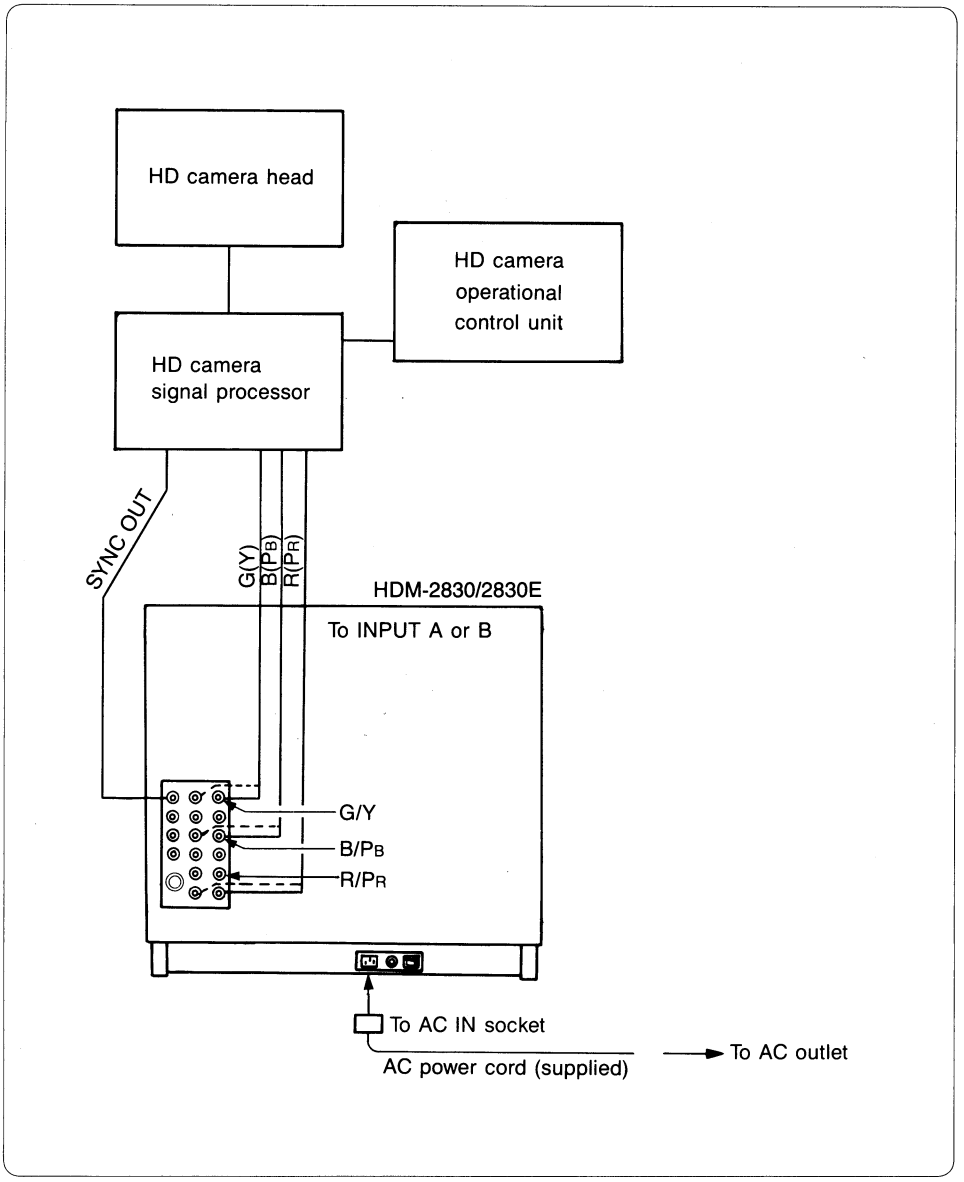
Plug Cap	Tandem blade with ground pin. (NEMA 6-15P Configuration)
Cord	Type SVT or SJT, three 16 or 18 AWG Wires.
Length	Maximum 15 feet
Rating	Minimum 10A, 250V

Changing the fuse

The fuse initially installed is as follows:
- 6.3A/125V fuse for 100-120V AC
- T4A/250V fuse for 220-250V AC

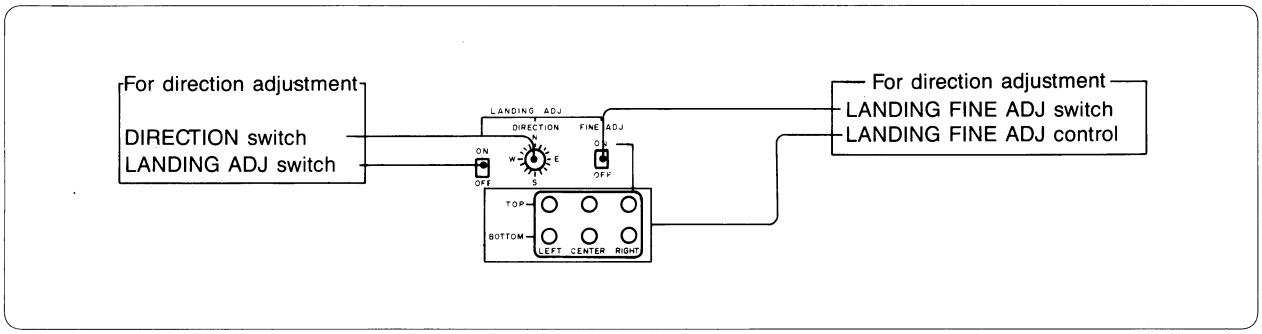
If you change the setting of the voltage selector, be sure to replace the fuse with the appropriate one.

1-3-2. Connection Example



1-3-3. Correcting Beam Landing

Correct the beam landing (purity) with the controls on the W board if there is mislanding caused by terrestrial magnetism. For correction, do the direction (coarse) adjustment first, and if color impurity still remains, go on to the fine adjustment.



Direction adjustment

1 Monitor the flat field signal (the internal test signal* or the input signal) and allow the unit for more than 30 minutes to start adjustment.

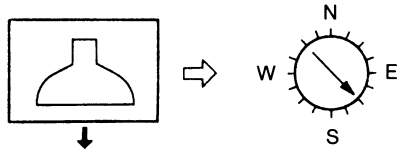
2 Set the LANDING ADJ switch to ON.

Set the LANDING FINE ADJ switch to OFF.

3 Press the DEGAUSS switch on the front panel.

4 First, use a compass to determine which direction the picture tube faces. Then, turn the DIRECTION switch and set the arrow-head to the same direction indication.

Example When the picture tube faces south-east



South-East

If you do not have a compass to check the direction, monitor the flat field signal and turn the DIRECTION switch for the best purity in white.

---

* **To monitor an internal test signal**
Press the INPUT/TEST key in the color temperature select mode. For details, refer to "1-5-5. Checking the Unit with the Internal Test Signals".

5 Press the DEGAUSS switch* * again.

↓

6 Check the purity.

If color impurity still remains, go on to the fine adjustment.

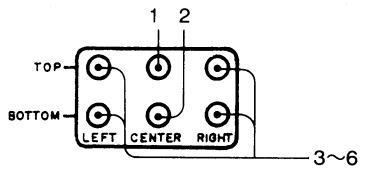
Fine adjustment

1 Set the LANDING FINE ADJ switch to ON.

↓

2 Turn the LANDING FINE ADJ controls to make the white signal as bright as possible in each area of the screen.

The indications of the controls correspond to the portion of the screen. Use the controls in the following order.



↓

3 Press the DEGAUSS switch* *

↓

4 If any errors still exist, please repeat steps 2 to 5 to correct the beam landing,

---

* * Wait for more than 5 minutes before pressing the DEGAUSS switch again. The switch does not function after while once it has been pressed.

1-4. Setting Switches according to the Input Signals

You can monitor the input signals fed to either the INPUT A or INPUT B connectors. Select which one to monitor with the INPUT selector on the front panel. According to the format of the input signals, set the switches on the JA board as follows.

Switch settings for input signal A

Signal format	Front panel	JA board (1-18 page)		
	INPUT selector	INPUT A system selector	INPUT A H PHASE selector	INPUT A mode selector
BTA/SMPTE standard HDTV signal (GBR)	A	HDTV-A	16:9	GBR
BTA/SMPTE standard HDTV signal ($Y/P_B/P_R$)				$Y/P_B/P_R$
Original format HDTV signal (GBR)			5:3	———
BTA/SMPTE standard HDTV signal (GBR)		HDTV-B	———	GBR
BTA/SMPTE standard HDTV signal ($Y/P_B/P_R$)				$Y/P_B/P_R$
525 lines non-interlace signal (GBR)		PROG	———	———

Do the same for input B signal using the switches for input B signal.

1-5. Adjustment

1-5-1. Selecting Adjustment Modes

Select the appropriate adjustment mode:

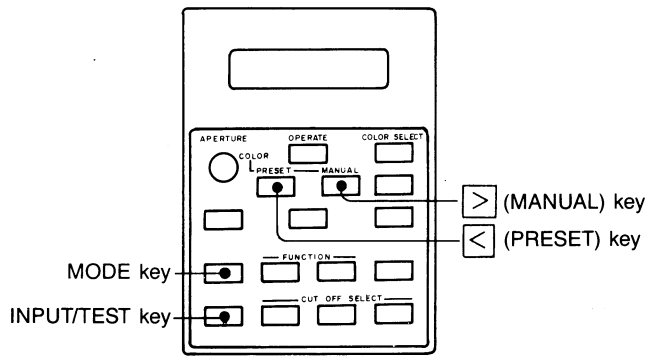
Color temperature select mode: To select the factory preset color temperature or color temperature which you have adjusted

Color temperature adjustment mode: To adjust the color temperature

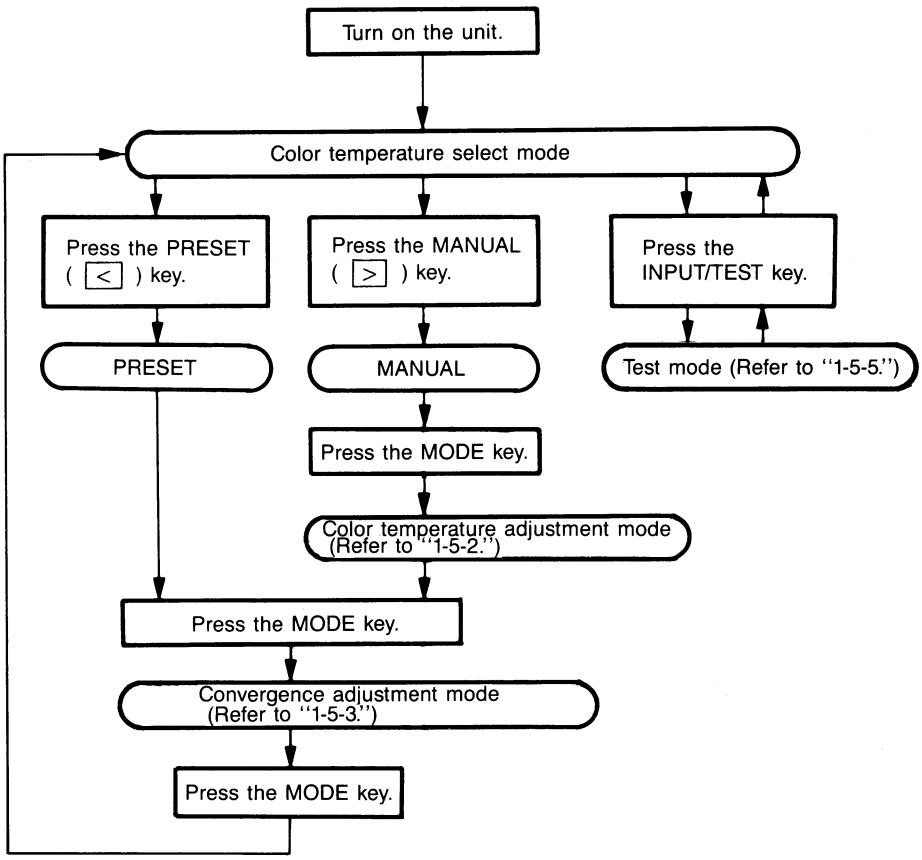
Convergence adjustment mode: To adjust the convergence

Internal test signal generator mode: To monitor the internal test signals used to check the unit's condition

When you turn on the unit, the unit is set in the color temperature select mode. Mode selection is performed by the N board of the sub-control panel.



To change the mode



Storing and recalling the adjusted data

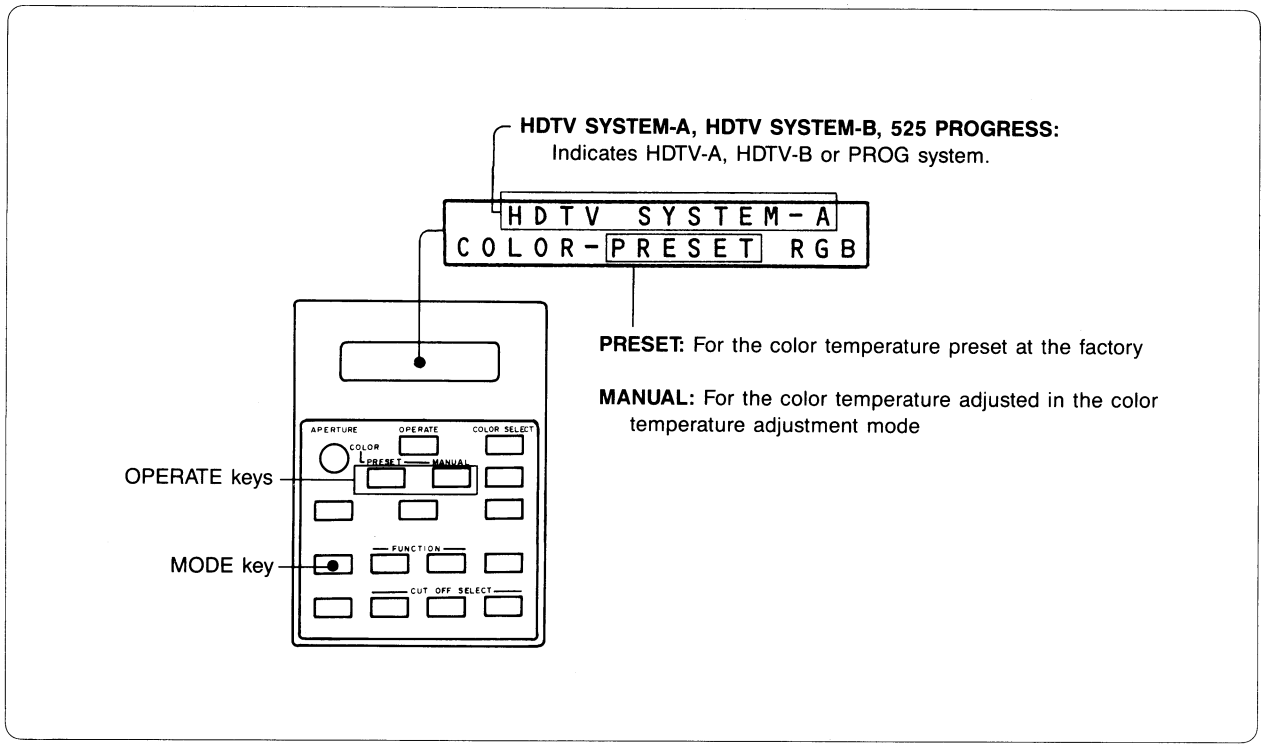
- Press the MODE key after adjusting the data in any mode. The new data is stored in the memory.
- Memories are backed up by battery and hold the data after the power is turned off.
- The unit has memories for the color temperature data which you have adjusted for each system separately, as well as a memory for the preset color temperature common to all the systems.
  The unit has memories for the convergence data which you have adjusted for each system separately, and for normal scanning mode and under scanning mode separately.
- It may take a little time to recall the data from the memories of a system when you change the setting of the INPUT A or B system selector on the JA board.
- The time may be longer when you change the setting in under scanning mode.

1-5-2. Adjusting Color Temperature

When the power is turned on, the unit is set in the color temperature select mode. To use the preset color temperature, select PRESET in this mode. To use the color temperature which you have adjusted, select MANUAL. If necessary, adjust the color temperature in the color temperature adjustment mode.

Color temperature select mode

Press the appropriate OPERATE key to select PRESET or MANUAL.

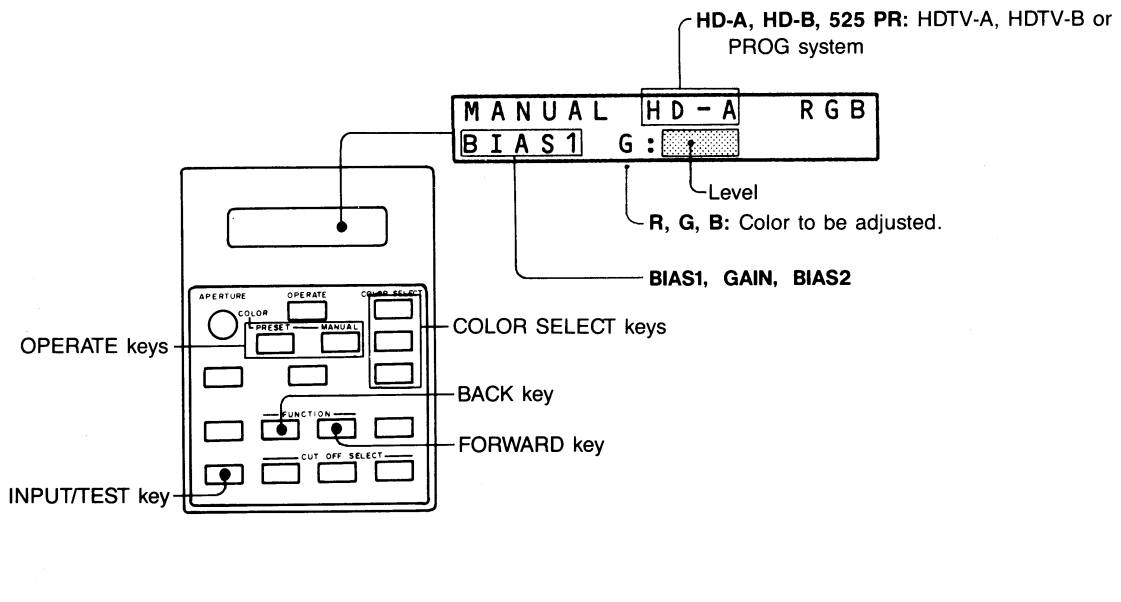


Color temperature adjustment mode

Press the MODE key after selecting MANUAL in the color temperature select mode to select the color temperature adjustment mode. In this mode, adjust the color temperature with bias 1 (black balance), gain (white balance), and bias 2.

Notes

- Allow the unit for more than 30 minutes to start adjusting the color temperature after you turn on the unit.
- Adjust the color temperature with the contrast and brightness set to their preset levels.
- In the color temperature adjustment mode, the BRIGHTNESS MANUAL control on the front panel does not function. The control will become operative again when you press the MODE key after adjusting the color temperature.
- Use a color analyzer for more precise adjustment.



Bias 1 adjustment

1 Select the color temperature adjustment mode.

Bias 1 adjustment is possible. 0% setup signal will be displayed.

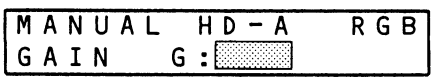
2 Select a color to be adjusted by pressing a COLOR SELECT key.

3 Press the OPERATE keys (< and > *) to adjust the black level of the color. It is recommended that the brightness be set to approximately 0.5 nit.

Gain adjustment

1 Press the FORWARD key after bias adjustment.

Gain adjustment is possible. 100% flat field signal will be displayed.



2 Select a color to be adjusted by pressing a COLOR SELECT key.

3 Press the OPERATE keys (< and >) to adjust the white level of the color. It is recommended that the brightness be set to approximately 60 nit.

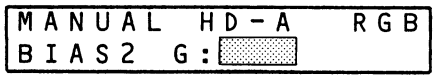
---

* Holding down < or > adjusts the data consecutively and pressing it adjusts the data step by step.

Bias 2 adjustment

1 Press the FORWARD key after gain adjustment.

Bias 2 adjustment is possible. 0% setup signal will be displayed.



2 Select the color to be adjusted by pressing a COLOR SELECT key.

3 Press the OPERATE keys ([<] and [>]) to adjust the black level of the color. It is recommended that the brightness be set to approximately 0.5 nit.

Checking color temperature

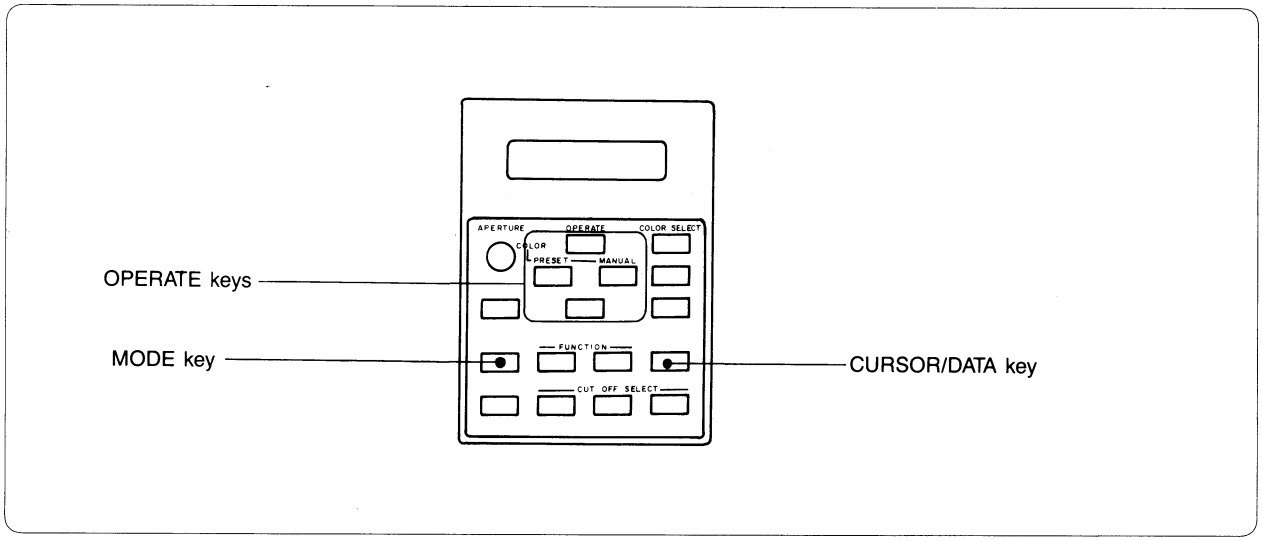
After bias 2 adjustment, press the INPUT/TEST key to display the gray scale signal and check the color temperature by monitoring the signal. If the color temperature is still not properly adjusted, repeat the gain and bias 2 adjustments and check the temperature again. Check the color temperature in modes other than the bias 1 and gain adjustment modes because the beam detector is deactivated in these modes.

Changing the signals

Besides using the setup and flat field signals, you can use gray scale signal or other input signals for color temperature adjustment. To use these signals, press the INPUT/TEST key in the color temperature adjustment mode. The signal will change as follows: Setup / flat field→gray scale→Input signal→Setup / flat field.

Copying the color temperature data

You can copy the adjusted color temperature data from one system to another. The R, G and B data, also the data on bias 1, gain and bias 2 are copied altogether.



1 Select the color temperature select mode and select MANUAL by pressing the OPERATE key ([>]).

```
  HDTV SYSTEM-A
COLOR-MANUAL  RGB
```

2 Selecting the destination
Set the INPUT A or B system selector to the system to which you want to copy the color temperature data.

Use the system select switch corresponding to the front panel selection of A/B input.

3 Press the MODE key to select the color temperature adjustment mode.

```
MANUAL  HD-A    RGB
BIAS1  G:▒▒▒▒
```

4 Press the OPERATE keys ([^] and [v]) at the same time to set the unit in the copy mode.

The LCD will show the source system, and also the destination system selected in step 2.

[Example] When the data is copied from the HDTV-B system to the HDTV-A system.

```
MANUAL  DATA  COPY
 HDTV-B → HDTV-A
```

Source system — Destination system selected in Step 2.

5 Changing the source system

Hold down the OPERATE key ([<] or [>]) to change the source system. If this is not necessary, skip this step.

The table below shows the source systems which correspond to the selected destination systems.

Destination	Source	
	[<]	[>]
HDTV-A	PROG.	HDTV-B
HDTV-B	PROG.	HDTV-A
PROG.	HDTV-B	HDTV-A

When you change the source system, the LCD will show the following message. (This example shows that [<] was pressed in the example in step 4.)

```
PUSH CURSOR/DATA
 PROG.    → HDTV-A
```

6 Copying the data

Hold the CURSOR/DATA key down while pressing the same OPERATE key ([<] or [>]) as the one you pressed in step 5. If you skipped step 5, hold the CURSOR/DATA key down while pressing the OPERATE key indicating the source system in the table in step 5. (For example, press [>] to copy the data without changing the source system shown in the example in step 4.)

Hold the keys down until the the message on the LCD changes as follows.

```
  COPYING DATA
HDTV-B→ HDTV-A
```

⇩

```
  COPY COMPLETE
HDTV-B→ HDTV-A
```

7 Canceling the copy mode

Press the MODE key to return to the color temperature adjustment mode.

The LCD shows the following message.

```
MANUAL  HD-A    RGB
BIAS1  G:
```

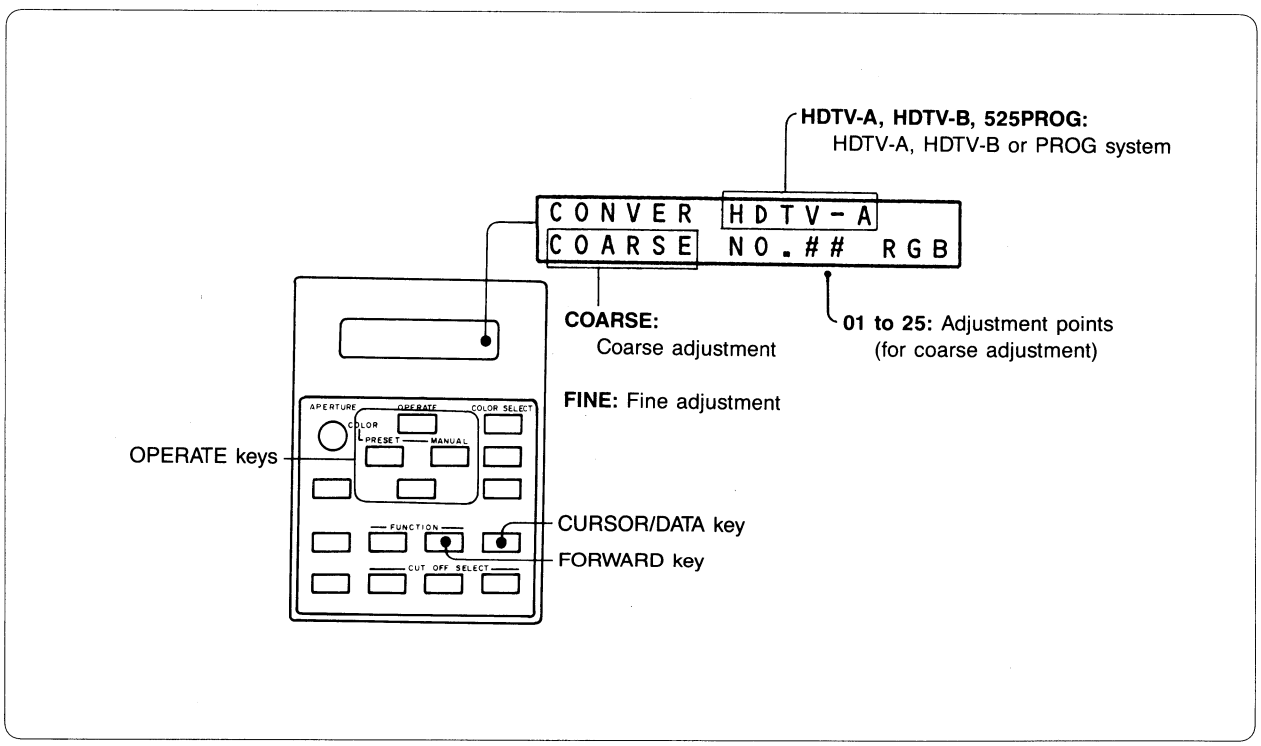
1-5-3. Adjusting Convergence

In the convergence adjustment mode, adjust it with the coarse and fine adjustments. Adjust the convergence for each system (HDTV-A, HDTV-B, PROG, UNDERSCAN HDTV-A, UNDERSCAN HDTV-B, UNDERSCAN PROG).
The memories for the convergence data are composed of twelve memories.

	HDTV-A	HDTV-B	PROG
Normal scan	COARSE (No.1—13) COARSE (No.14—25) & FINE	COARSE (No.1—13) COARSE (No.14—25) & FINE	COARSE (No.1—13) COARSE (No.14—25) & FINE
Under scan	COARSE (No.1—13) COARSE (No.14—25) & FINE	COARSE (No.1—13) COARSE (No.14—25) & FINE	COARSE (No.1—13) COARSE (No.14—25) & FINE

To adjust the convergence data initially, reset the COARSE data in the system before adjustment. For resetting the data, refer to "1-5-4. Resetting the Adjustment Data". After COARSE adjustment, perform FINE adjustment.

Note
Before you perform COARSE adjustment, always reset the FINE data. If you don't reset the data, COARSE adjustment may not be possible.

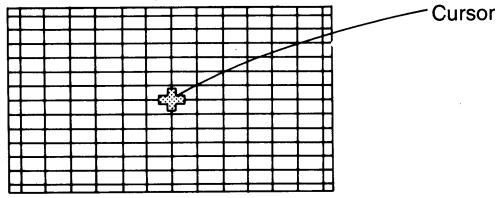


1 Select the convergence adjustment mode.

Coarse adjustment is possible in this mode.

```
CONVER  HDTV-A
COARSE  NO.01  RGB
```

The crosshatch pattern is displayed.

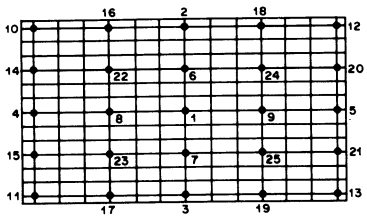


2 Press the appropriate OPERATE keys to adjust the convergence where the cursor is.

The red line moves in the same direction as it is indicated on the arrow key while the blue line moves in the opposite direction. Adjust the convergence so that both the red and blue lines converge on the green line.

3 Press the CURSOR/DATA key to move the cursor to the next adjustment point.

There are twenty-five adjustment points. Every time the key is pressed, the cursor moves to the next point in the following order. While the key is held down, the cursor moves in the opposite order.



To adjust accurately

Repeat steps 2 and 3 to adjust the convergence in each position.

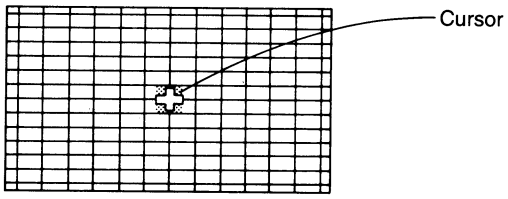
Fine adjustment

1 Press the FORWARD key in the convergence adjustment mode.

Fine adjustment is possible.

```
CONVER  HDTV-A
 FINE  CURSOR  RGB
```

The cursor blinks at the center of the crosshatch pattern.



2 Press the OPERATE key to move the cursor to a point to adjust.

The cursor can be moved to every crosspoint.

3 Press the CURSOR/DATA key.

The cursor stops blinking and the LCD shows the following message.

```
CONVER  HDTV-A
 FINE   DATA   RGB
```

4 Press the appropriate OPERATE keys to adjust the convergence where the cursor is.

5 Press the CURSOR/DATA key again.

The cursor starts blinking again. Repeat steps 2 to 5 to adjust the convergence at each crosspoint.

Note

When the cursor starts blinking during convergence adjustment, the end of the memory has been reached. If you need more precise adjustment, see the convergence adjustment in Section 4.

1-5-4. Resetting the Adjustment Data

You can reset the color temperature and convergence data, as follows.

Data Type	Data after resetting	Notes
Color temperature	Preset data	The data on R, G and B, and the data on bias 1, gain and bias 2 are set to the preset level.
Convergence	The center position within adjustable range	All data (COARSE No.1—25 and FINE) is reset in COARSE adjustment mode.

Selecting the data to reset

The color temperature data can be reset in each system (HDTV-A, HDTV-B, PROG) independently, and the convergence data can be reset in each system (HDTV-A, HDTV-B, PROG, UNDERSCAN HDTV-A, UNDERSCAN HDTV-B, UNDERSCAN PROG).
Select the system by setting the INPUT A or B system selector and select each adjustment mode before resetting the data. (The LCD must show the following message.)

Data	Mode	LCD
Color temperature	Color temperature adjustment mode	MANUAL HD-A RGB BIAS1 G: BIAS 1, GAIN or BIAS 2 ↑ ↑ RGB
Convergence coarse adjustment data	Convergence adjustment mode (Coarse adjustment)	CONVER HDTV-A COARSE NO.## RGB 1~25
Convergence fine adjustment data	Convergence adjustment mode (Fine adjustment)	Press the CURSOR/DATA key to stop the cursor blinking. CONVER HDTV-A FINE DATA RGB

Note

When you reset the convergence data in Fine adjustment mode, COARSE No.14—No.25 and Fine data is reset.

Resetting the data

1 Hold down both OPERATE keys ([<] and [>]).

The LCD shows the following message.

```
   RESET  OK?
Keep  <  >  pushing
```

2 Hold down the keys for a second unitl the following message appears.

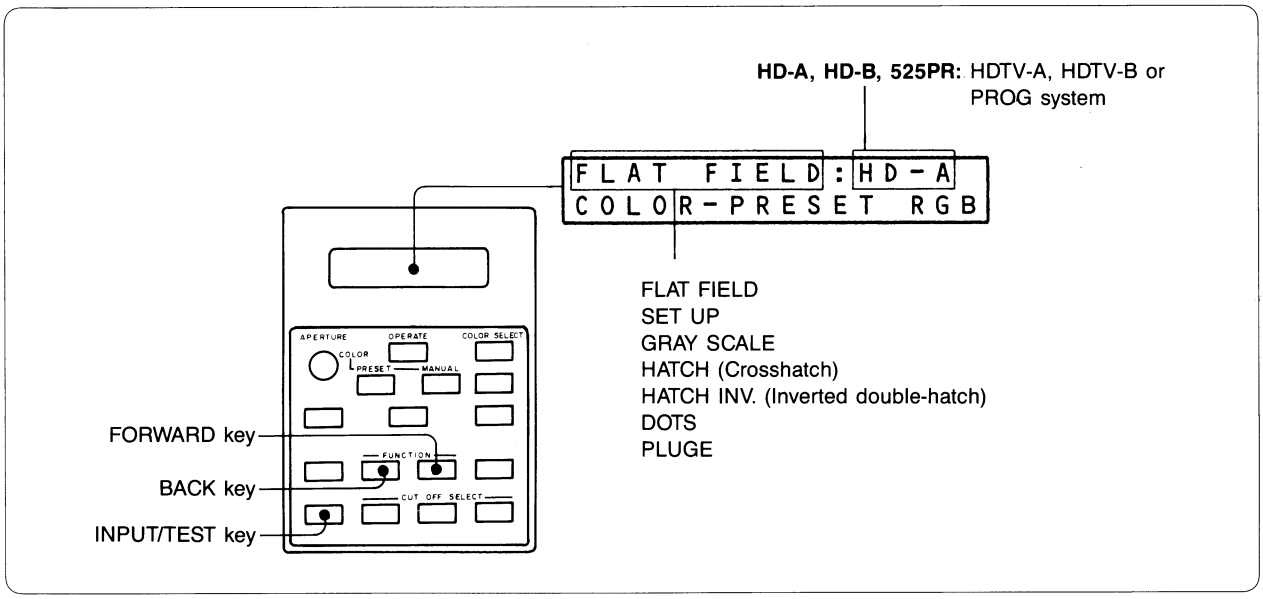
```
   RESET
      COMPLETE
```

The data is now reset.

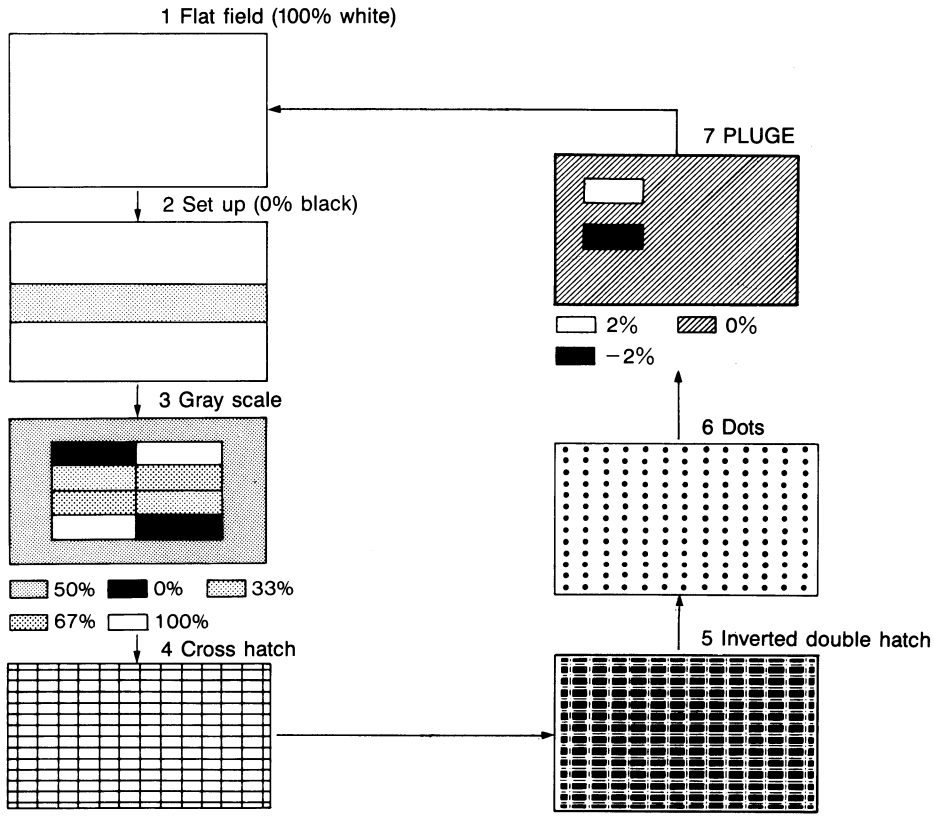
To stop the operation before the data is reset, release the OPERATE keys before the above message appears.

1-5-5. Checking the Unit with the Internal Test Signals

The unit has a test signal generator which generates seven test signals. You can display the test signals in the test mode to check the monitor. Press the INPUT/TEST key in the color temperature select mode to select the test mode.

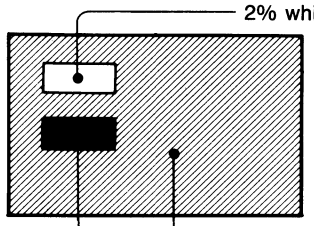


Every time you press the FORWARD key, the pattern changes in the order shown below. Pressing the BACK key changes the signal in the reverse order.



Adjusting the brightness using the PLUGE signal

To adjust the brightness with the BRIGHTNESS MANUAL control on the front panel depending on the ambient light, use the PLUGE signal and adjust as follows.



1-6. Specifications

	System	1125 lines, 60 fields/sec, interlaced 1 HDTV studio standard (BTA/SMPTE standard) 2 Original HDTV standard (only the RGB input) 525 lines, 59.94 frames/sec., non-interlaced
	CRT	Super Fine Pitch Trinitron 0.35 mm phosphor trio pitch, 90° deflection, 36.5 ϕ in-line gun Effective picture size: 348.8 × 620 mm (h/w) (13 5/8 × 24 1/2 inches) 711.4 mm (28 inches) measured diagonally

Input connectors and signals

Connectors

	G/Y, B/P_B, R/P_R	BNC (2), 75 ohms or high impedance (with loop-through output)
	EXT SYNC	BNC (1), 75 ohms or high impedance (with loop-through output)
	HD, VD	BNC (1), 75 ohms
	Remote control	10-pin

Video signals

	HDTV	GBR: Composite, 1.0 Vp-p or non-composite, 0.7 Vp-p Sync signal is ±0.3 Vp-p ±6 dB tri-level bipolar sync or 0.3V ±6 dB sync, negative. Y/P_B/P_R: Composite, 1.0 Vp-p or non-composite, 0.7 Vp-p P_B and P_R is ±0.35 Vp-p, and the sync signal is ±0.3V ±6 dB tri-level bipolar sync.
	525 lines, non-interlaced	R/G/B: Composite, 1.0 Vp-p or non-composite, 0.7 Vp-p Sync signal is 0.3 ±6 dB sync, negative.

Sync signal

	EXT SYNC	±0.3V±6 dB tri-level bipolar sync or 0.3V±6 dB sync, negative
	HD, VD	4 Vp-p±6 dB sync, negative

Video signal

Frequency response	60 Hz to 30 MHz $^{+0.5}_{-3}$ dB (from video input to RGB final stage when the APERTURE is OFF)
Waveform distortion	Overshoot: Less than 10% (at RGB final stage when a square wave (rise time: 0.01 μsec) is input) Sag: Less than 2%
Linearity	DG: Less than 5% (from video input to RGB final stage)
DC restoration	Clamp voltage regulation: Less than 1% of input video signal, 10% to 90% APL
Noise	Less than −55 dB (p-p/p-p) (RGB final stage, with video input terminated with 75-ohm)
Matrix error ($Y/P_B/P_R$)	Within 3%

Deflection and high voltage

Minimum sync level	Internal sync: −10 dB External sync: −10 dB
Deflection distortion	Within a central area bounded by a circle whose diameter equals the picture height, within 1% of the picture height (only in the HDTV system)
Picture size	Normal scan: 5% overscan Underscan: 3% underscan
Interlace	Within 55:45 (only in the HDTV system)
Retrace time	Horizontal: Less than 3.77 μsec. Vertical: Less than 650 μsec.
Anode voltage	30 ± 0.2 kV
EHT load regulation	Less than 1%
Convergence	Center: Less than 0.5 mm Corners: Less than 0.8 mm
Luminance	20 Ft-L (When 100% white is input at the preset level)
Color temperature	

mode	Color temperature
PRESET	6500K + 8MPCD
MANUAL(HDTV-A)	6500K + 8MPCD
MANUAL(HDTV-B)	6500K + 8MPCD
MANUAL(PROG)	9300K + 8MPCD

Nominal chromaticity coordinates

	X	Y
R	0.630	0.340
G	0.310	0.595
B	0.155	0.070

Resolution

Center
Horizontal: More than 1000 TV lines
Vertical: More than 750 TV lines
Corners
Horizontal: More than 950 TV lines
Vertical: More than 700 TV lines

Environment

Operating temperature	0°C to 40°C (32°F to 104°F)
Optimum temperature range	20°C to 30°C (68°F to 86°F)
Operating humidity	10% to 85%
Storage temperature	−20°C to +60°C (−4°F to 140°F)
Altitude	Lower than approx. 3,050 m (10,000 feet)

Others

Warm up time	More than 30 minutes
Power requirements	90 to 132V or 198 to 264V AC selectable, 50/60 Hz
Power consumption	330W
Battery life for nonvolatile memory	More than five years
Weight	92 kg (202 lb 13 oz)
Dimensions	754 × 615 × 677 mm (w/h/d) (29 3/4 × 24 1/4 × 26 3/4 inches)
Supplied accessories	Fuse (2) (6.3A/125V or T4/A250V) Remote connector (1) Tally number plate (1) Drawer key (1) AC power cord (1) 75-ohm termination plug (4) Operation and maintenance manual (1) Screwdriver (1)
Optional accessory	VF-503 monitor hood

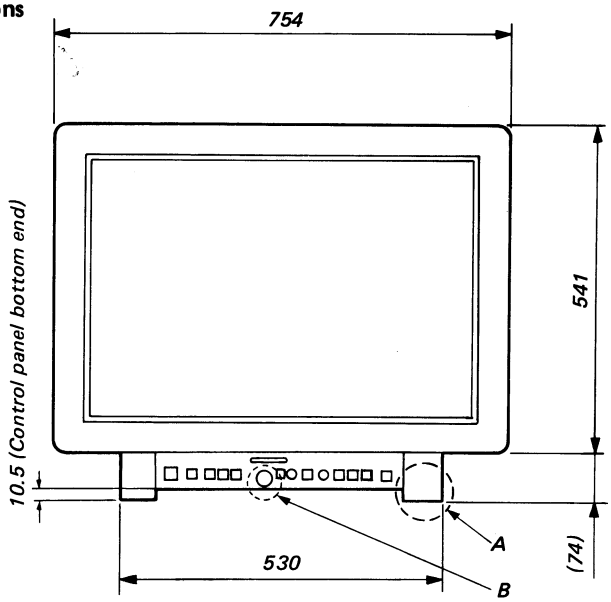
Design and specifications are subject to change without notice.

SECTION 2
EXTERNAL DIMENSIONAL DIAGRAM, FIXING METHOD, AND DISASSEMBLY

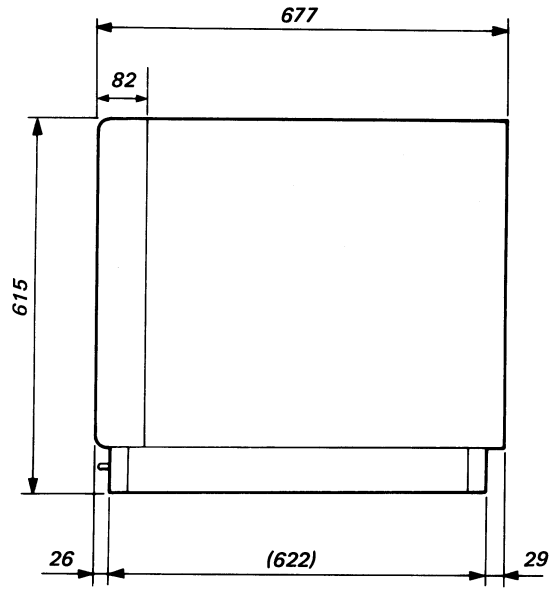
2-1. EXTERNAL DIMENSIONAL DIAGRAM AND FIXING METHOD

Dimensions

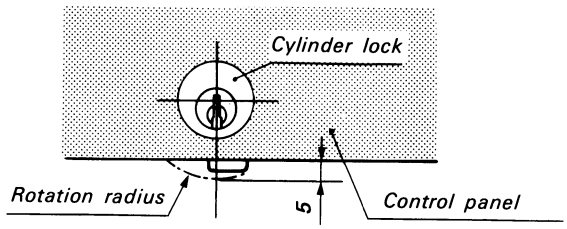
(Front side)



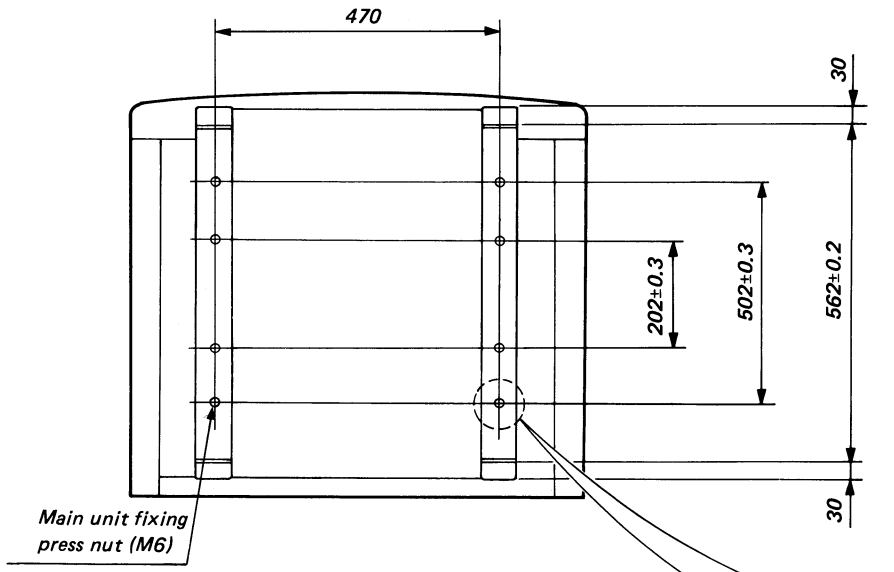
(Side)



Detailed diagram of B section

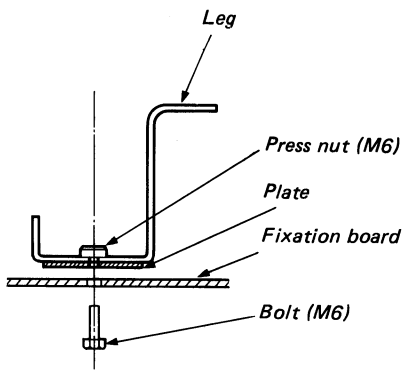


(Bottom side)



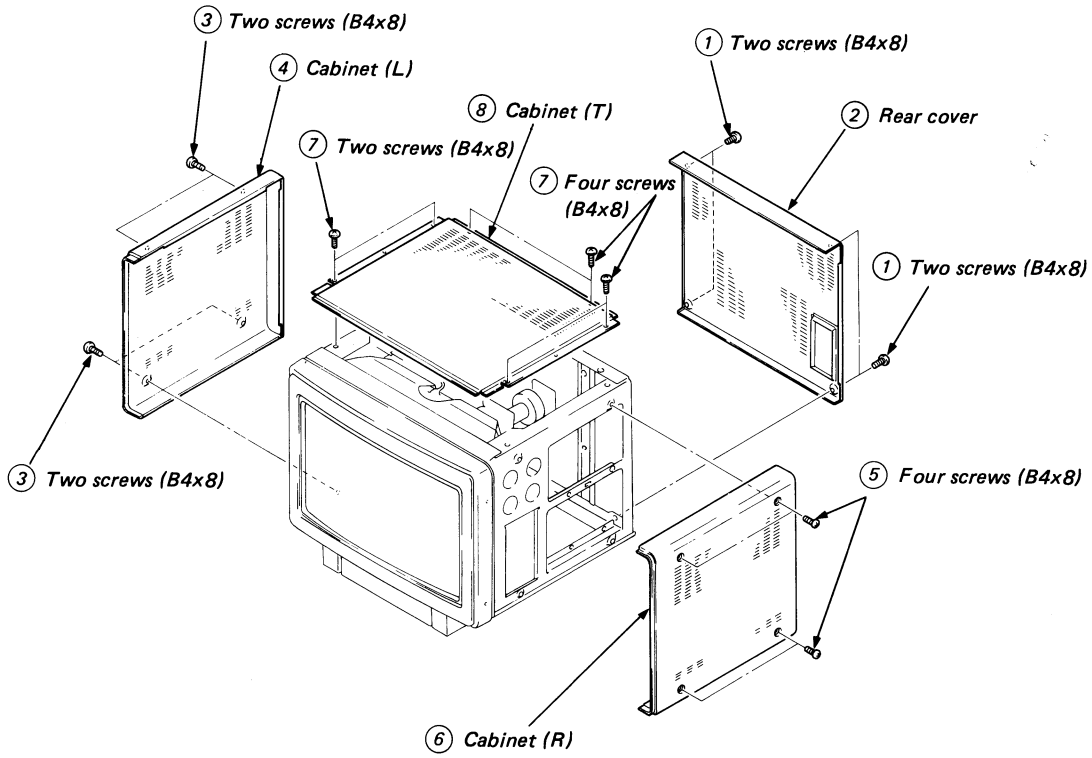
Fixing method

Main unit A section fixation detailed cross section

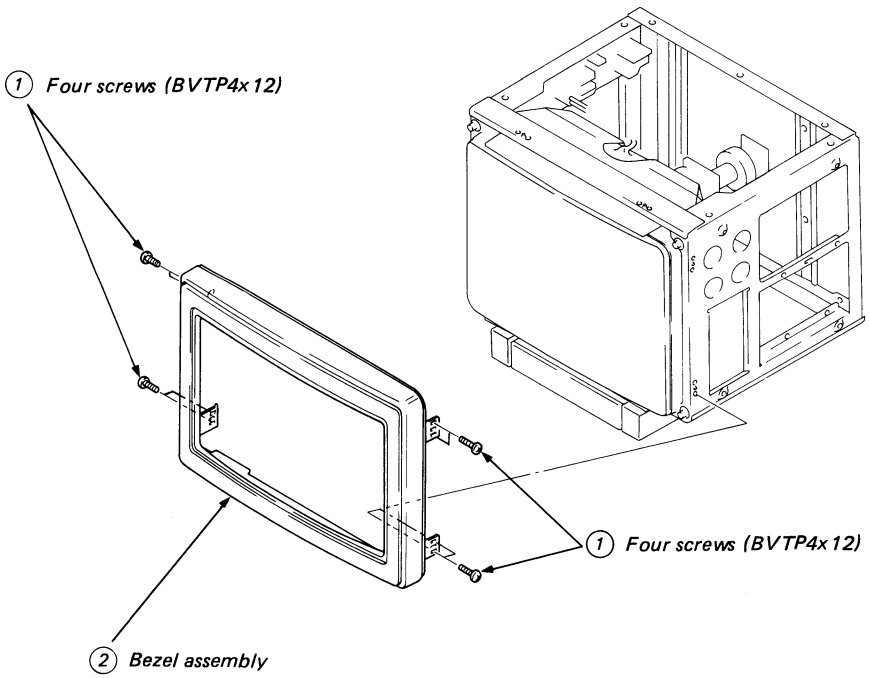


Note: There are eight press nuts (M6) installed on the leg section for fixing the main unit.
When fixing the leg, use the above mentioned bolts (M6).

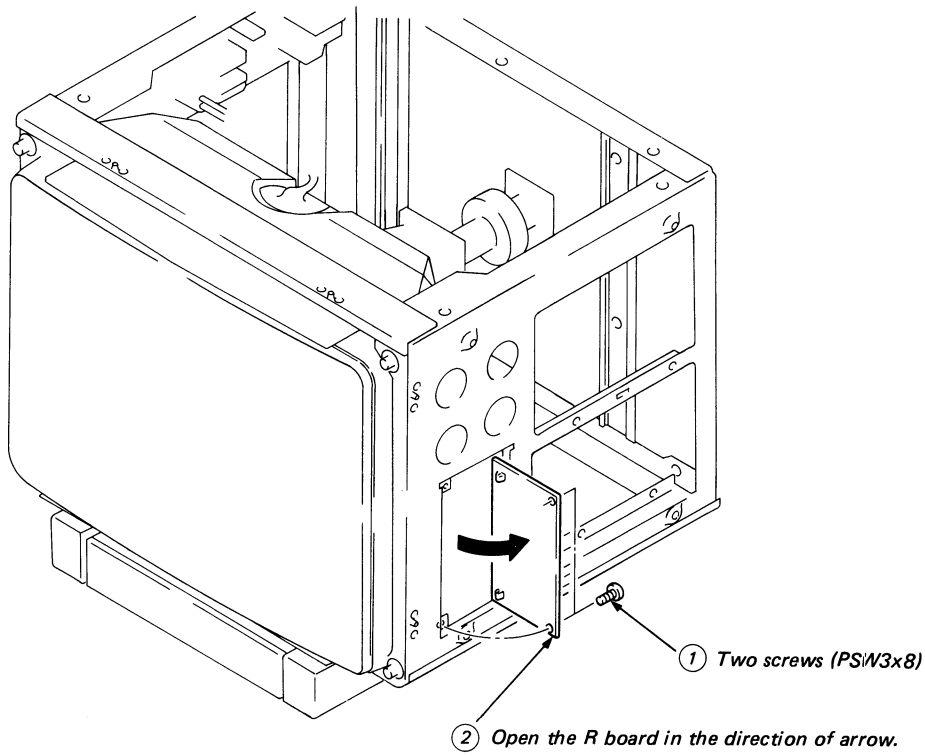
2-2. REMOVAL OF THE CABINET



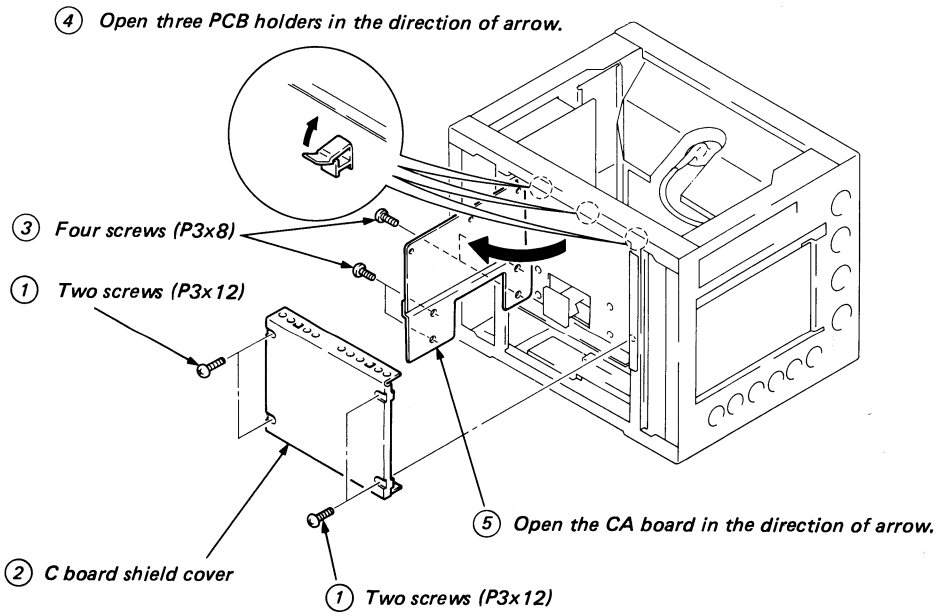
2-3. REMOVAL OF THE BEZEL ASSEMBLY



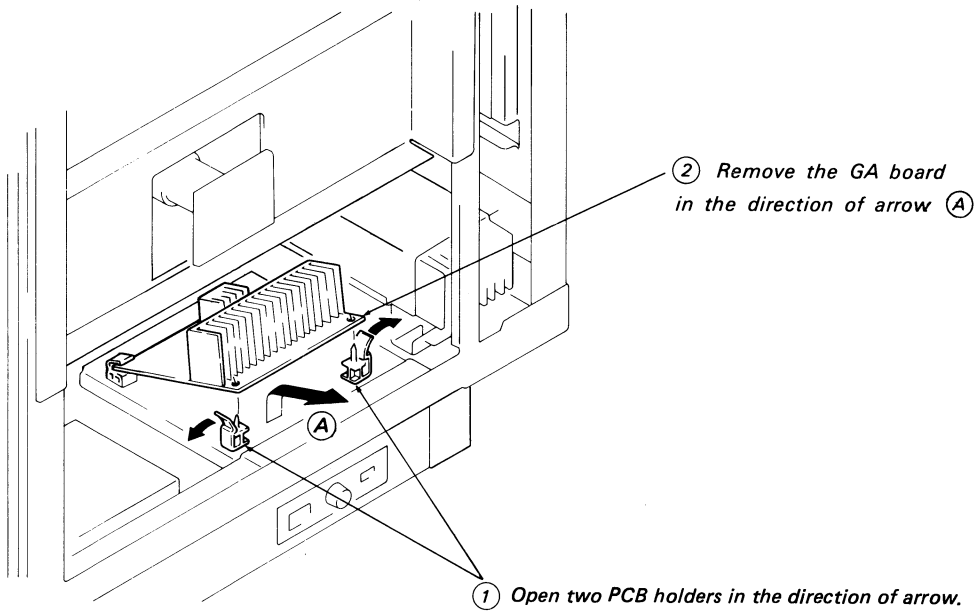
2-4. INSPECTION METHOD OF THE R BOARD



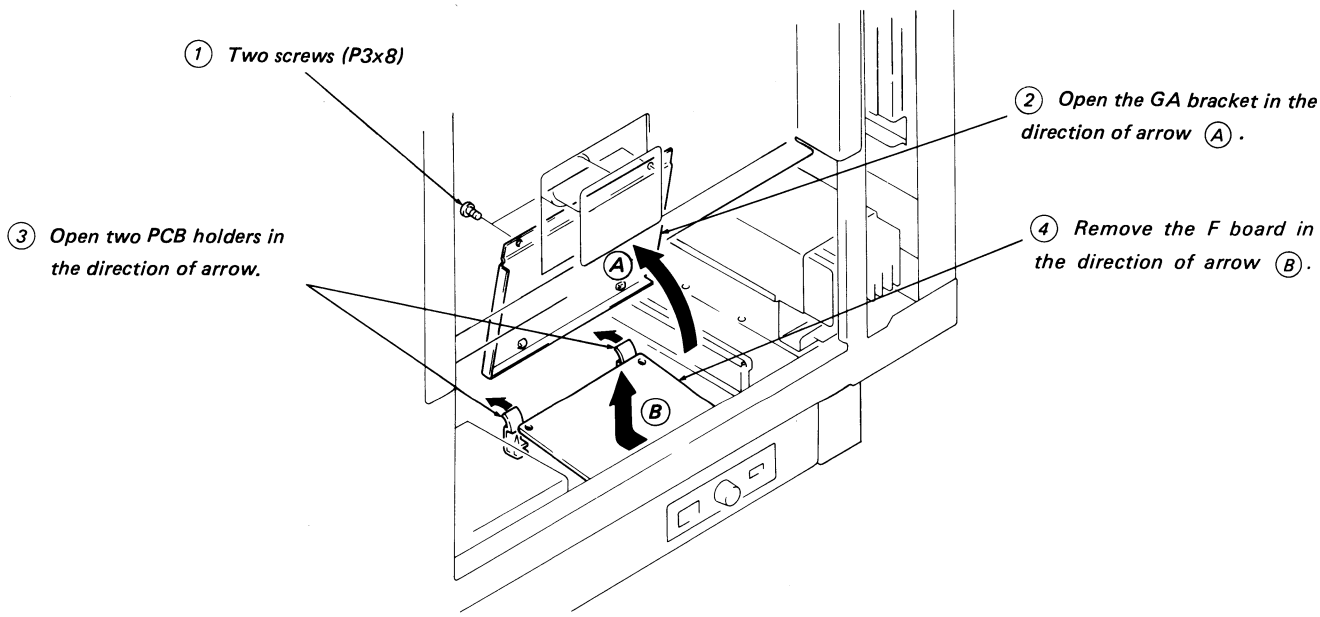
2-5. INSPECTION METHOD OF THE CA BOARD



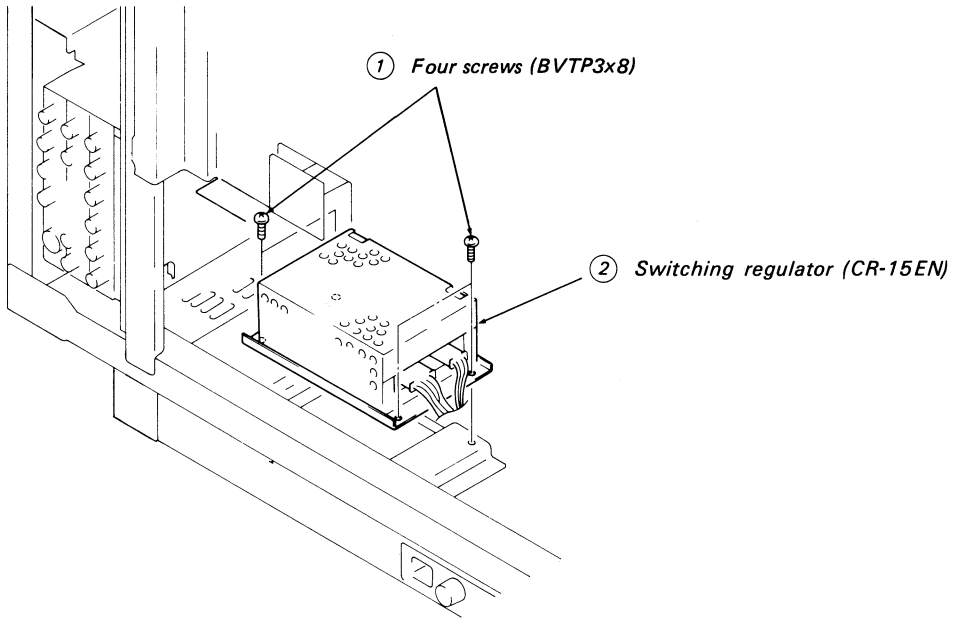
2-6. REMOVAL OF THE GA BOARD



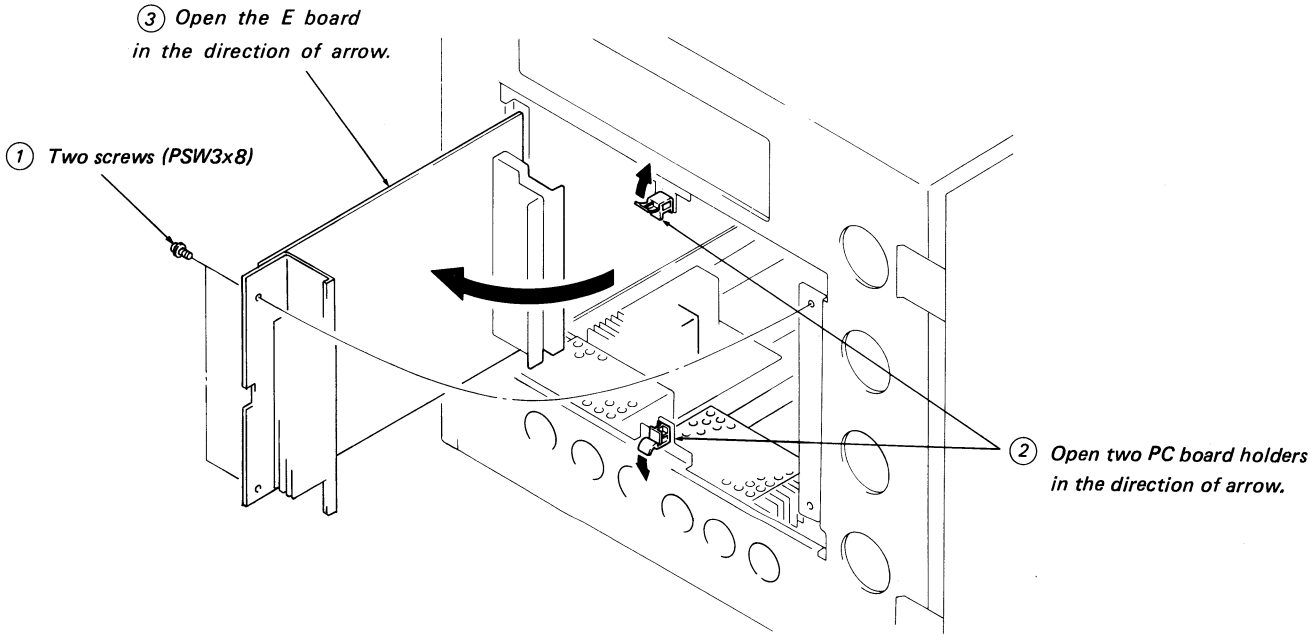
2-7. REMOVAL OF THE F BOARD



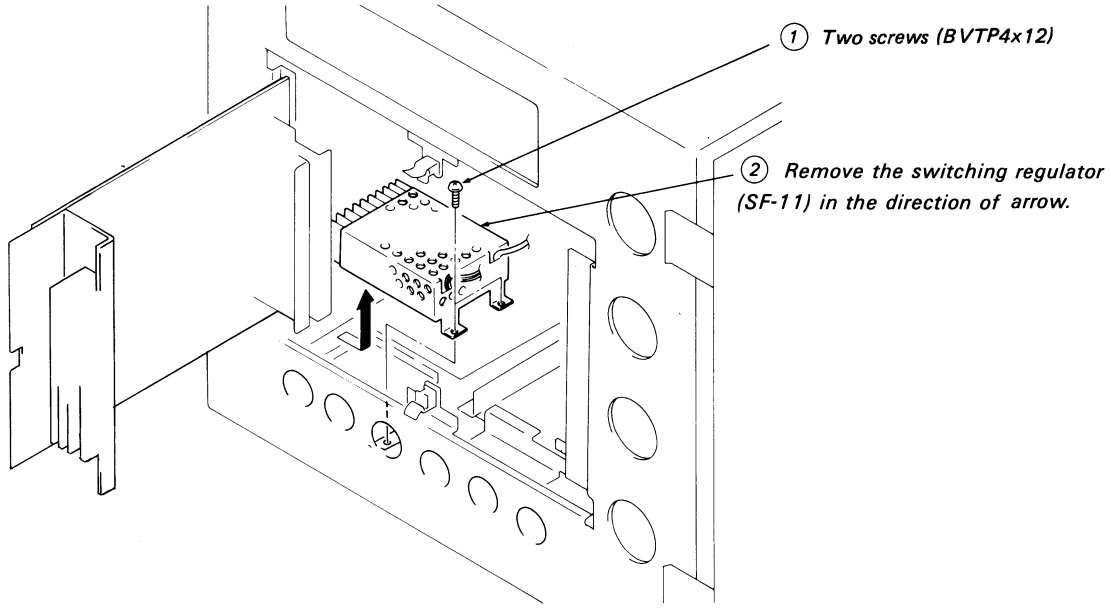
2-8. REMOVAL OF THE SWITCHING REGULATOR (CR-15EN)



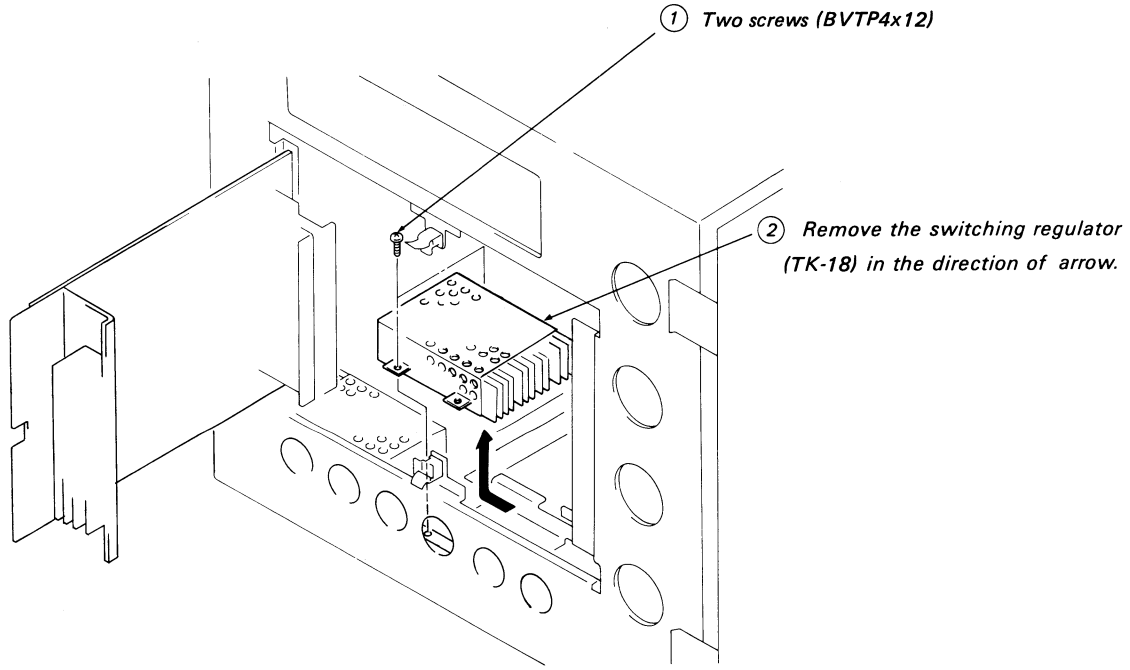
2-9. INSPECTION METHOD OF THE E BOARD



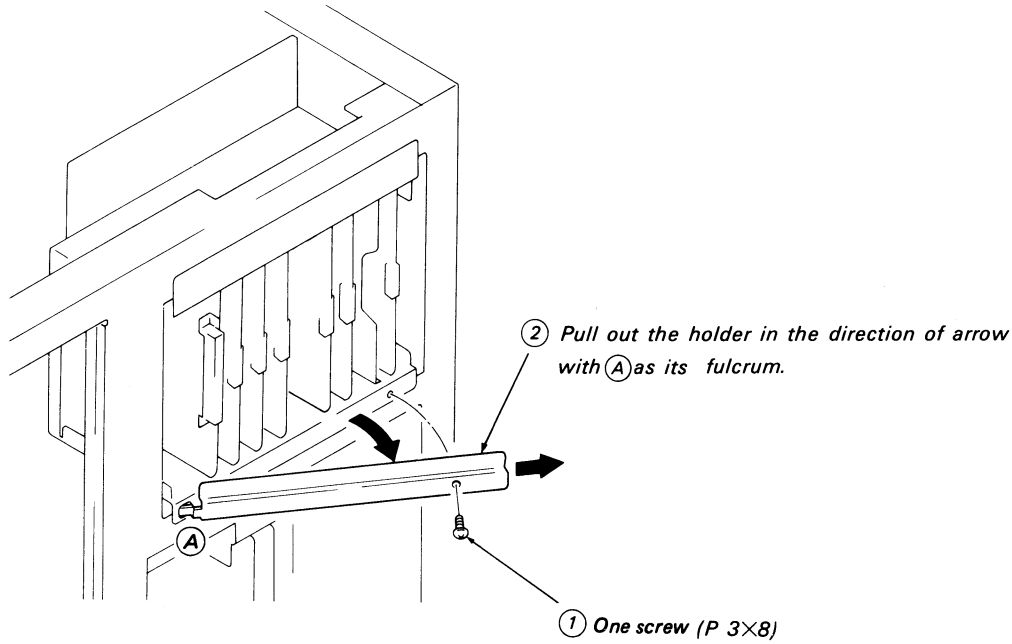
2-10. REMOVAL OF THE SWITCHING REGULATOR (SF-11)



2-11. REMOVAL OF THE SWITCHING REGULATOR (TK-18)



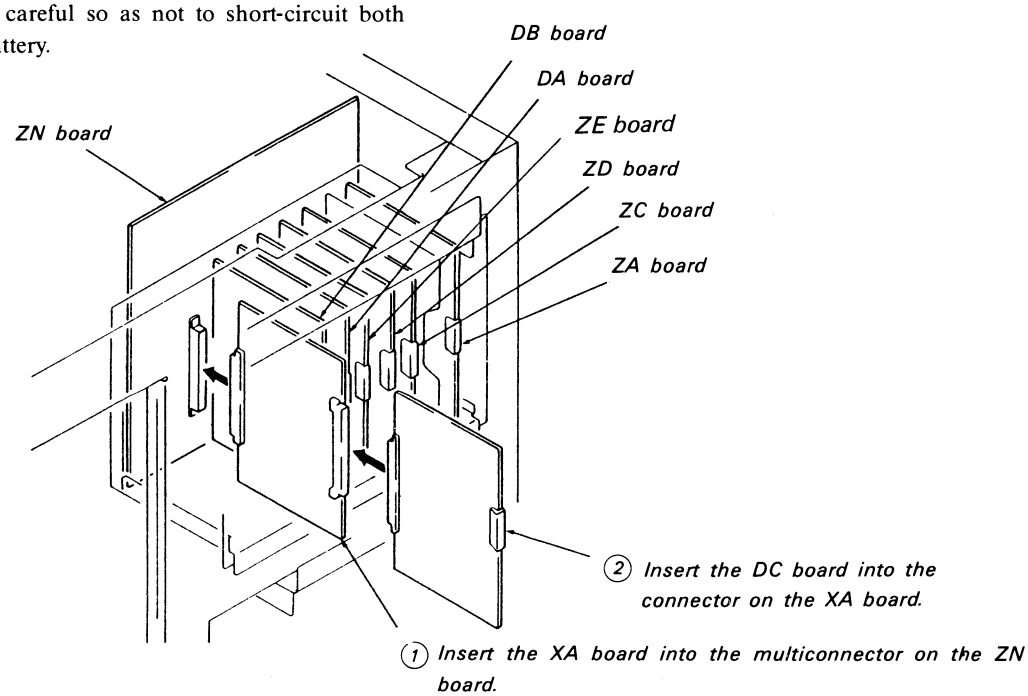
2-12. REMOVAL OF THE HOLDER (Z)



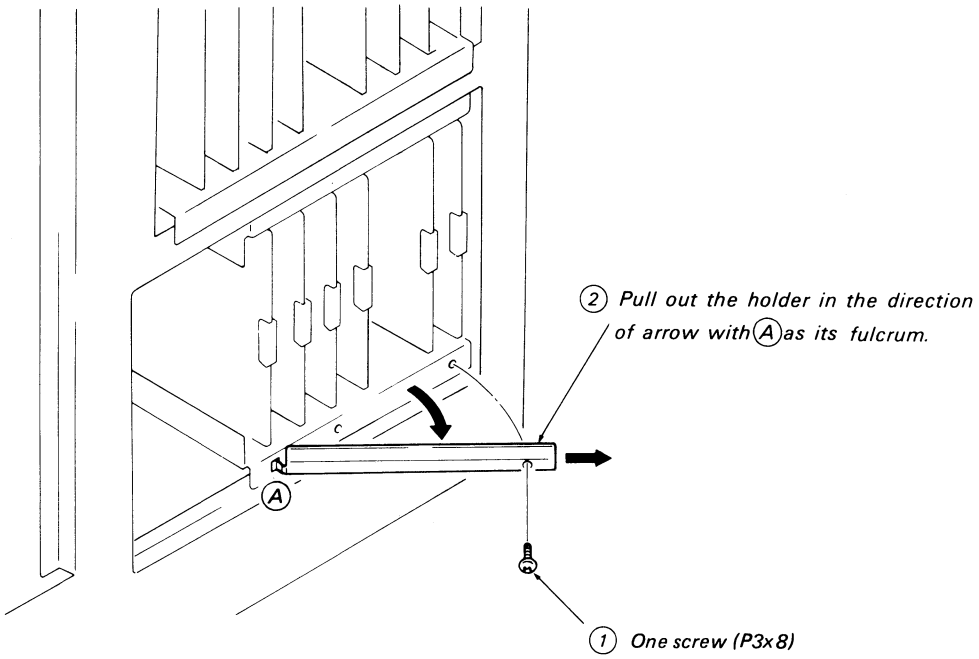
2-13. INSPECTION METHOD OF THE DC BOARD

Note: Boards DA, DB, ZA, ZC, ZD and ZE can similarly be inspected.

Note: When removing the cover of the ZD board during inspection, be careful so as not to short-circuit both ends of the battery.

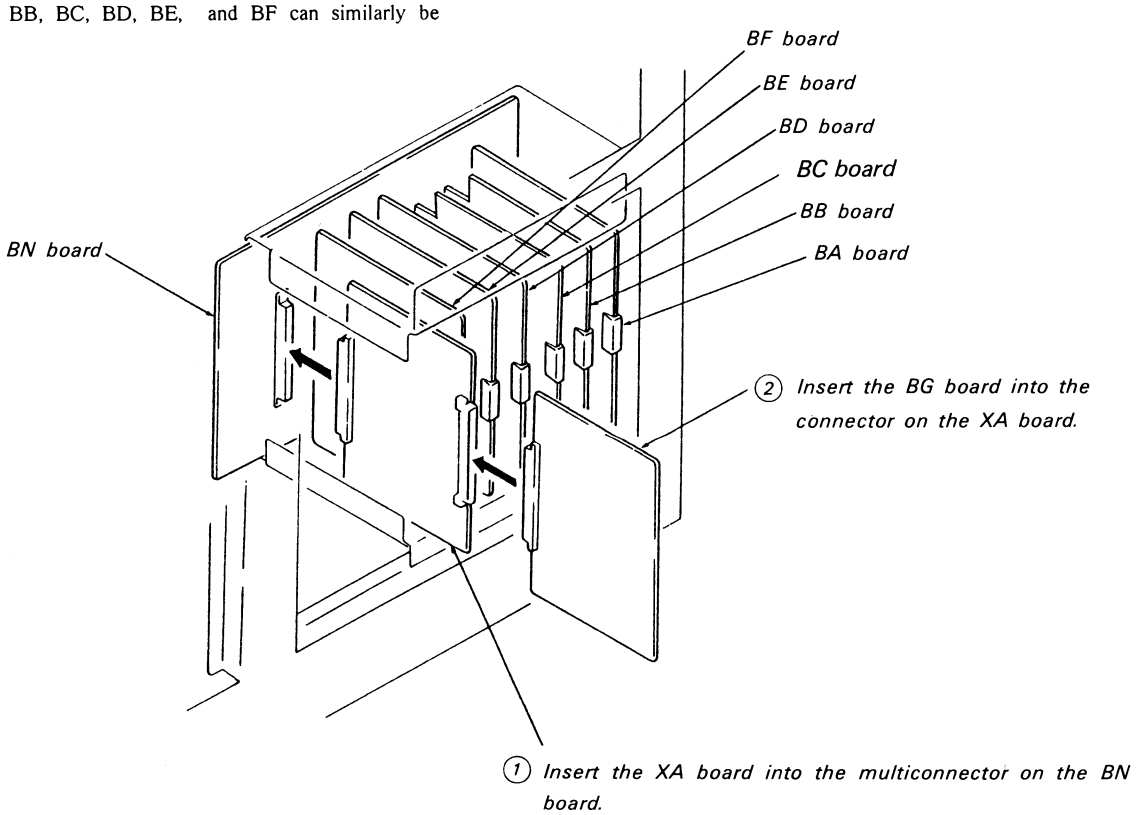


2-14. REMOVAL OF THE HOLDER (B)



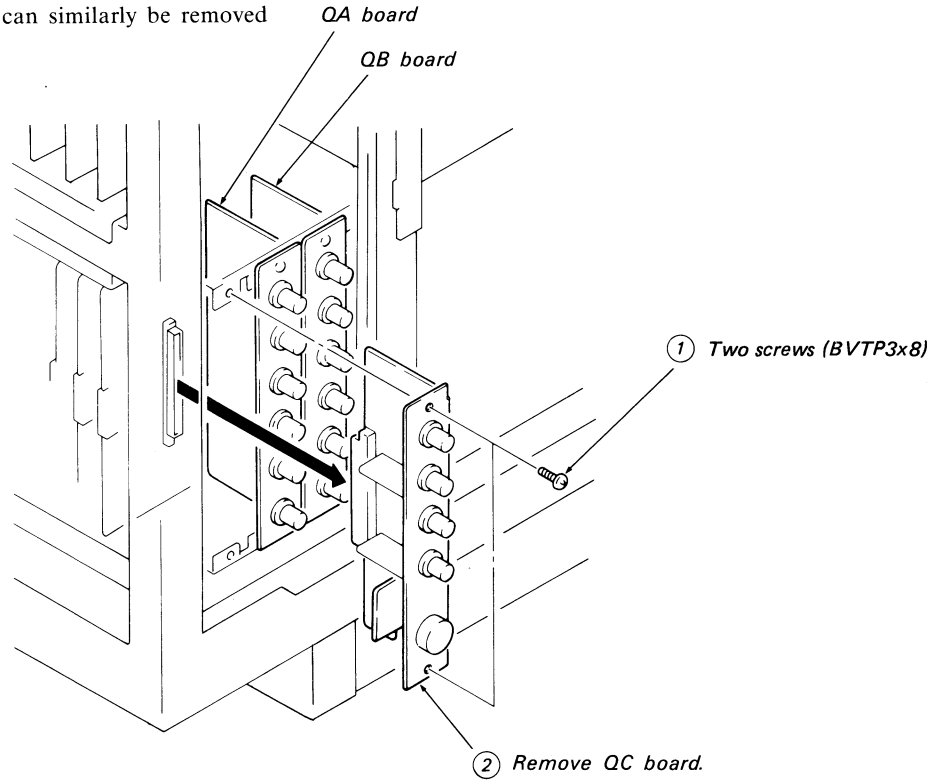
2-15. INSPECTION METHOD OF THE BG BOARD

Note: Boards BA, BB, BC, BD, BE, and BF can similarly be inspected.

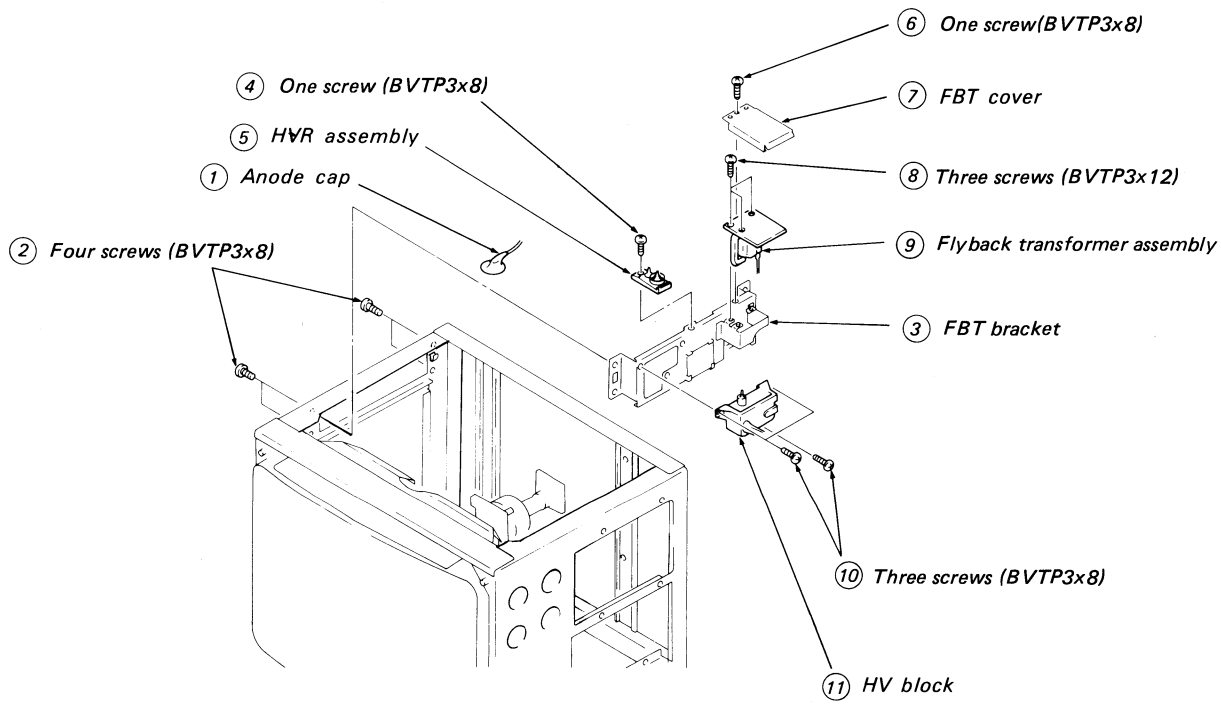


2-16. REMOVAL OF THE QC BOARD

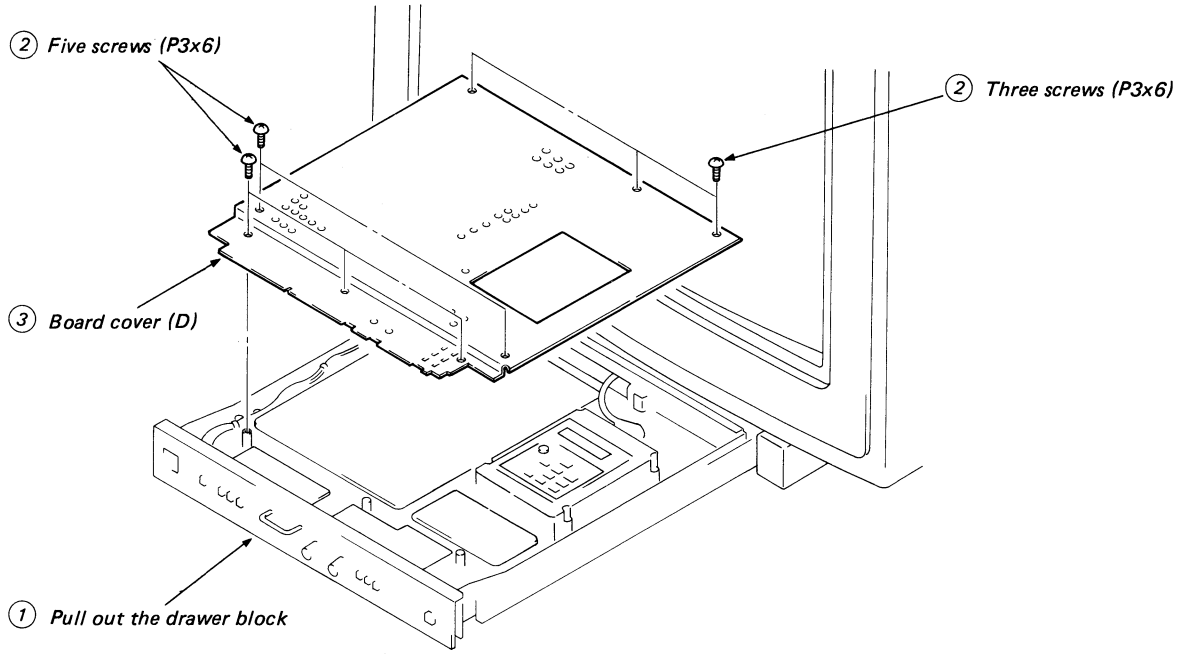
Note: Boards QA and QB can similarly be removed



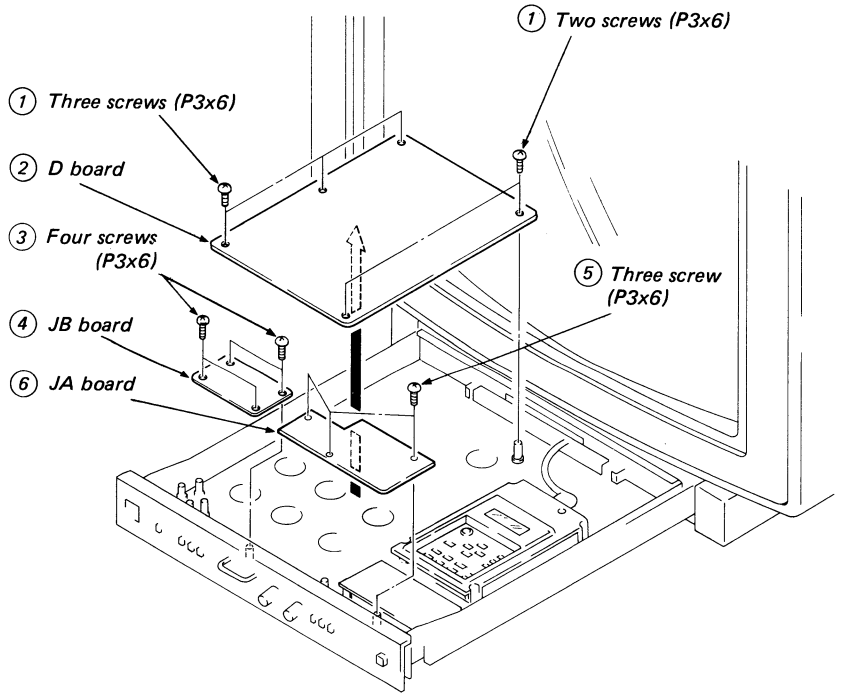
2-17. REMOVAL OF THE FLYBACK TRANSFORMER AND HV BLOCK



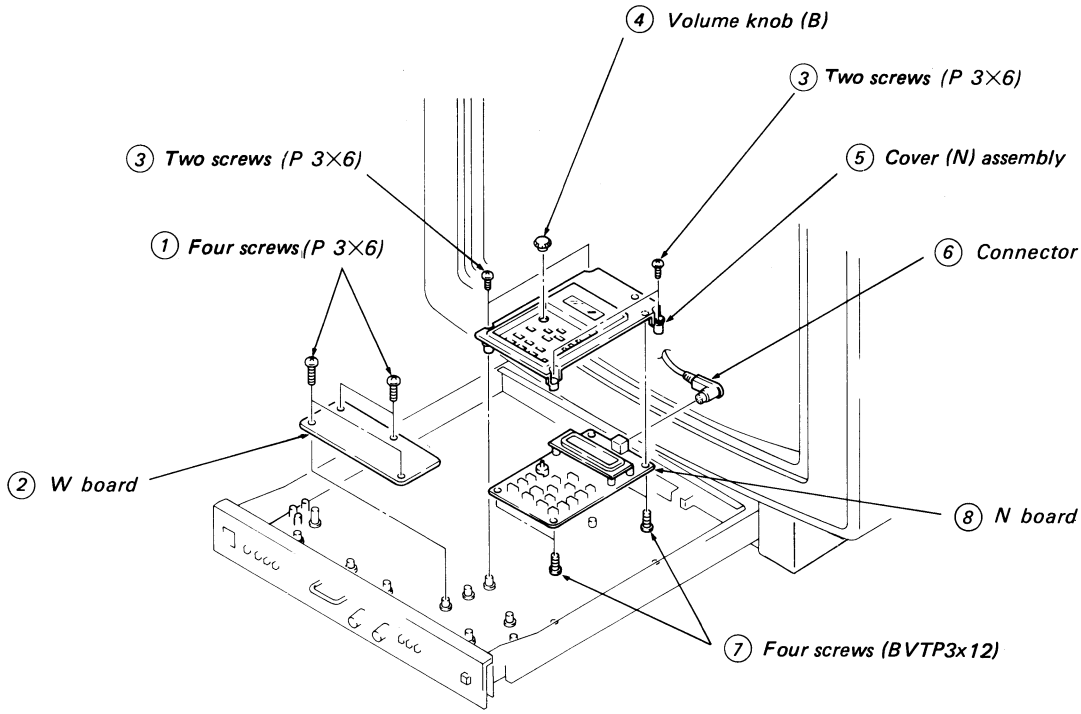
2-18. REMOVAL OF THE BOARD COVER (D) (SUB CONTROL PANEL)



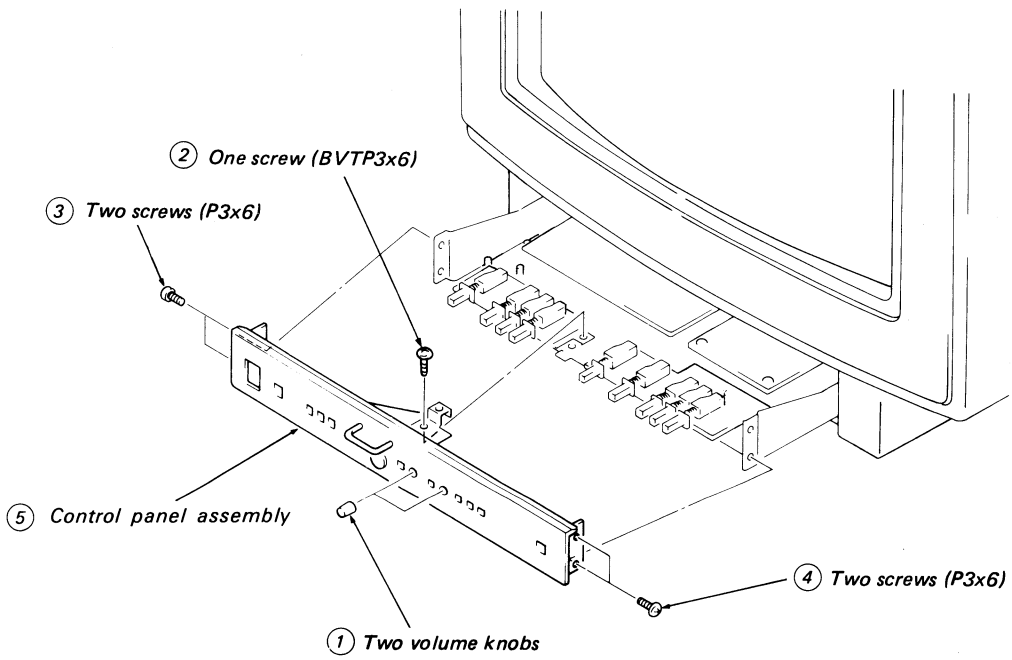
2-19. REMOVAL OF THE BOARDS D, JA, AND JB



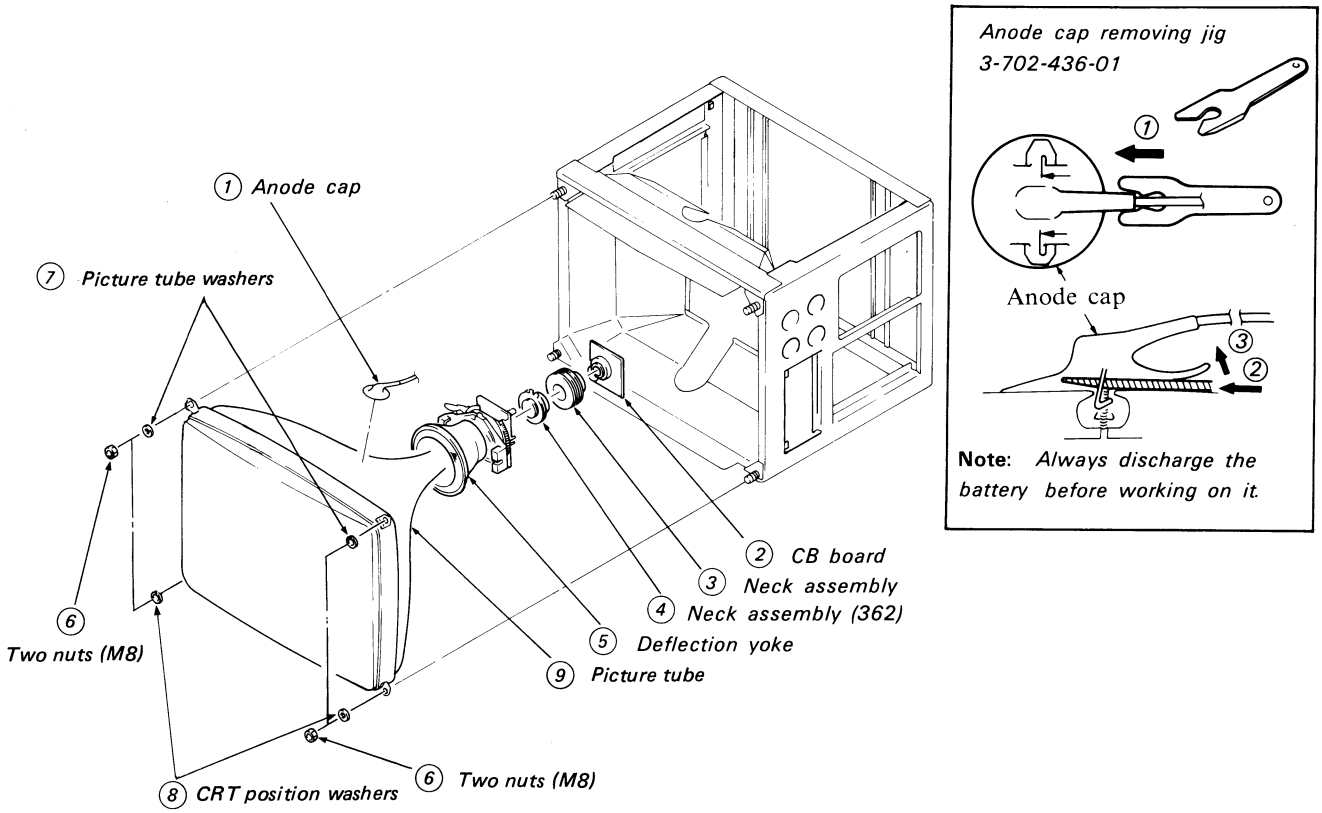
2-20. REMOVAL OF THE BOARDS W AND N



2-21. REMOVAL OF THE CONTROL PANEL ASSEMBLY

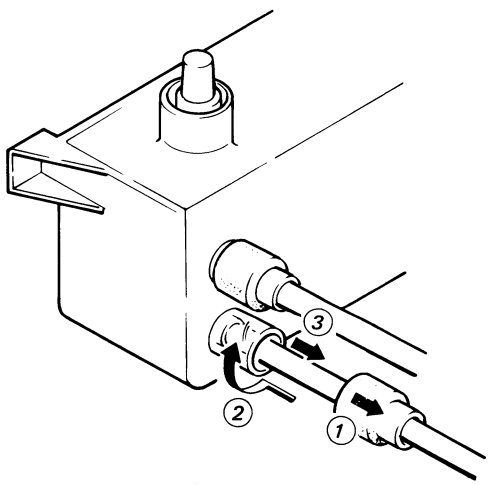


2-22. REMOVAL OF THE PICTURE TUBE



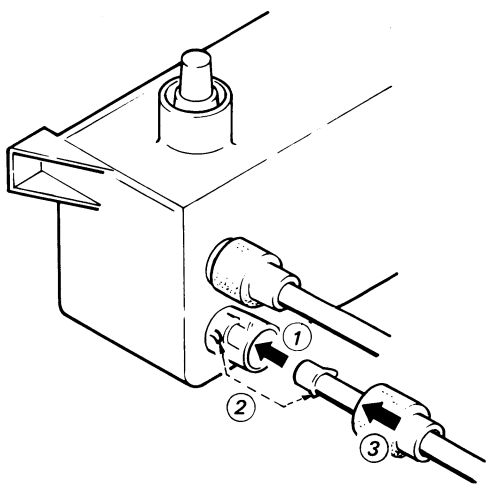
2-23. INSTALLING AND REMOVAL METHOD OF HIGH VOLTAGE CABLE

(1) Removal



While pushing cable with (2) and (3), turn 90 and pull out.

(2) During insertion



Confirm with (2) that it is locked.

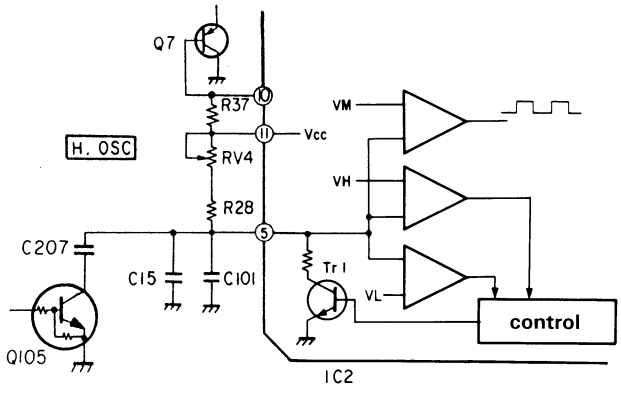
SECTION 3
CIRCUIT DESCRIPTION

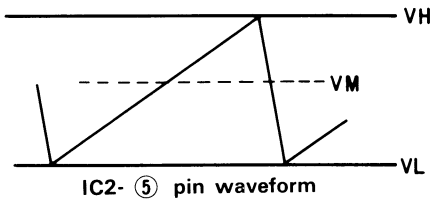
HORIZONTAL OSCILLATOR CIRCUIT (D BOARD)

When power is turned on, the capacitors C15/C101 are charged through RV4/R28 so that the IC2-⑤ pin potential is raised. Since the IC2-⑤ pin is connected to the comparator inside IC2 internally, the transistor Tr1 is switched ON when IC2-⑤ pin potential is higher than VH, while the transistor Tr1 is switched OFF when IC2-⑤ pin potential is lower than VH.

If the time constant that is connected to the IC2-⑤ pin is smaller, then the oscillating frequency will be higher, accordingly. If the time constant is longer, the oscillating frequency will be lower.

This oscillator waveform is amplified inside the IC2 and becomes the horizontal drive pulse at pin ⑩ that is output through an emitter follower Q7.





IC2- ⑤ pin waveform

Horizontal oscillator circuit

AFC CIRCUIT (D BOARD)

AFC is the automatic frequency control loop that functions to detect the phase difference between the deflection circuit output and the input signal, by sampling the sawtooth voltage (this signal is obtained by integrating the horizontal deflection circuit output with R17/C10) with the H. SYNC pulse that is used as the gate signal. The gated sawtooth is then smoothed out.

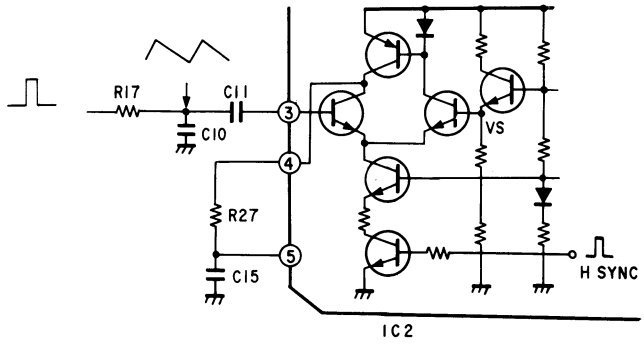
The detected phase difference output is fed back to the IC2-⑤ pin through R27 so that the oscillating frequency deviation can be corrected automatically.

The picture phase can also be changed by shifting the horizontal deflection pulse phase (RV1, RV2, RV72, RV73 and IC1).

In the PR mode, Q105 is turned on, C207 is connected in parallel to C15 and C101, and the free-run frequency decreases.

H PHASE (PICTURE PHASE) ADJUSTMENT

HDTV A	16:9 (new specifications)	RV1
	5:3	RV2
HDTV B		RV72
PROG		RV73

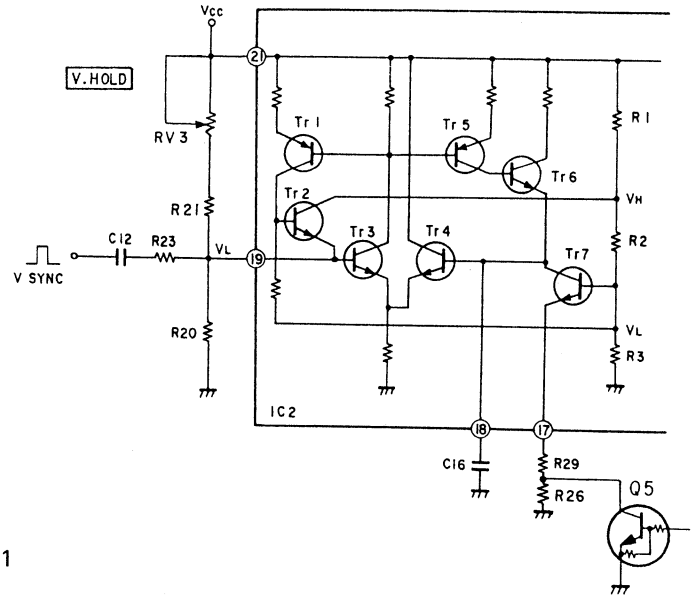


AFC circuit

VERTICAL OSCILLATOR CIRCUIT (D BOARD)

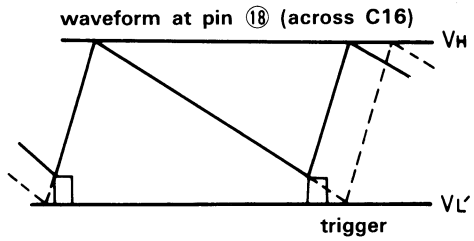
The vertical oscillator circuit operation is basically same as the horizontal oscillator circuit. But it does not need the AFC circuit unlike the horizontal oscillator block. It has simply the trigger circuit by the vertical SYNC signal.

The C16, R29, R26 are the oscillating time constants. When the SYNC signal is not input, the transistor Tr3 base potential becomes VL' that is determined by RV3, R21, R20. Whenever power is turned on, since the Tr4 base is grounded, the Tr3 is turned on. As Tr1, Tr2 are switched on, the Tr3 base reaches VH. The Tr5, Tr6 are also switched on to charge C16 rapidly. As the Tr4 base potential is becoming higher than Tr3 base gradually, Tr3, Tr1, Tr2, Tr5, Tr6 are turned off so that C16 is discharged through Tr7, R29, R26. As Tr4 base reaches VL', the Tr3 is switched on and repeat the afore-mentioned oscillation.



If SYNC signal is input while the C16 is discharging as shown in Figure, the Tr3 is put into conduction (ON), so that the C16 is started charging to obtain synchronization.

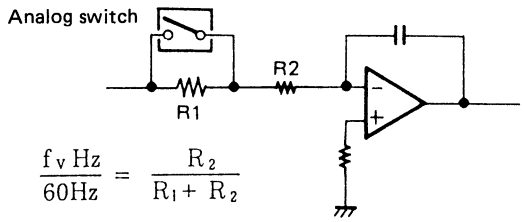
This output signal is amplified inside IC and becomes the positive polarity pulse at pin ㉒ . The pulse width of this signal is determined by the time constant of R34, C18 that are connected to pin ⑬ .



Furthermore, Q5 is turned on when a low fv is selected, lowering the free-run frequency of the vertical sync.

On the Vertical Cycle Compensation Waveform

There are many Miller integrator circuits (e.g. IC8, IC9 and IC10) inside the D board. If nothing is done to prevent it, their amplitude and phase would change when fv changes. Therefore, the input side resistance is set as shown in the figure, turning it on with the analog switch when frequency is 60 Hz and off when fv is low. In this way, the integrated output is kept constant.



VERTICAL DRIVE WAVEFORM GENERATING CIRCUIT (D BOARD)

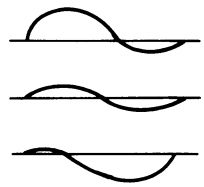
The operational amplifier IC7 (½) is used for sawtooth wave generation.

The C29, R63 form a Miller integrator circuit that generates sawtooth signal having good linearity. R63 is connected to a voltage determined by R60, RV5 and RV6. When frequency is 60 Hz, amplitude is determined by RV5. While at 60 Hz Q9 is on, at 50 Hz Q9 is off and RV6 operates. The Q10 works as a switch that resets this integrator by VD during retrace period. The sawtooth wave signal of ±6V is provided at IC7-① pin. The IC7 (2/2) is the polarity invertor and IC8 (1/2) is the similar Miller integrator that converts output into parabolic wave at ⑦-pin that is again passed through IC8 (2/2) integrator so that output signal becomes sinusoidal (sine) wave.

The vertical drive waveform is generated by mixing these sawtooth wave signal and the sinusoidal wave signal at IC9 (½). The vertical linearity correction can be adjusted by changing the sinusoidal wave amplitude gain with RV9.

The sawtooth wave from RV7 and the parabolic wave are mixed and input to IC8-② pin. Since RV7 can change the sawtooth wave vertical balance, the RV7 can consequently change the linearity correction balance at the top and bottom of picture at IC8-① pin as shown in Figure. The vertical drive waveform receives amplitude adjustment by RV10 and is output through a buffer amplifier IC9 (2/2).

Q13 is the picture size select switch to be used during set-up.



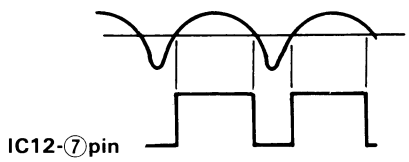
TOP AND BOTTOM PIN DISTORTION CORRECTION CIRCUIT (D BOARD)

The vertical drive voltage that is supplied from IC9-⑦ pin, is amplitude adjusted by RV18 and supplied to IC15-⑦ pin and is then routed to IC16-① pin.

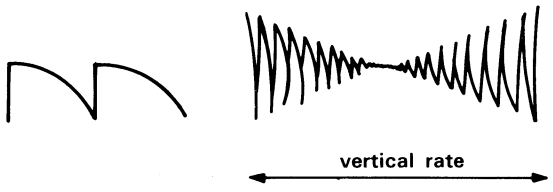
This signal is two integrators of IC14 (1/2) and IC14 (2/2) that provides horizontal rate parabolic wave that is supplied to IC16-⑩ pin.

Q22, Q23 are reset switch where its timing is determined by IC12, IC13.

Since IC16 is a balanced modulator IC, signal is balanced-modulated by the pin ⑨ input signal. The output IC16- ⑫ pin has therefore top and bottom pin correction waveform output as shown in figure. This output is sent through an emitter follower Q25. The horizontal parabola phase is determined by IC12 and IC13. The horizontal pulse from the horizontal deflection circuit is switched by Q19, and is integrated twice by L1, C41 to generate the parabolic wave. This waveform is passed through a comparator IC12 so that the reference pulse synchronized with the horizontal defection is obtained at IC12-⑦ pin.



Using this reference pulse, a triangular wave is generated by Q20, R137, C63. This signal is input to comparator IC13-③ pin and output at IC13-⑦ pin. Dc voltage is supplied from RV17 to IC13-② pin so that the phase of this output pulse can now be changed by RV17. This output signal is routed to Q21 to be converted to the reset pulse of Q22, Q23.



LEFT AND RIGHT PIN CORRECTION WAVEFORM CIRCUIT (D BOARD)

IC10-① pin (½) receives the mixed signal of the sawtooth wave from IC7-⑦ pin, sinusoidal wave from IC8-① pin whose amplitude can be adjusted by RV54, and the dc voltage from RV12. After passing through the integrator IC10, the left and right pin correction waveform is obtained at IC10-⑦ pin.

In the HDTV A, gain of this waveform is adjusted by R113 and RV14, then it is output via the buffer amplifier IC11.

The horizontal picture size control voltage is selected by RV15, then it passes through IC28 and the voltage follower IC11 before being output.

BLANKING WAVEFORM GENERATING CIRCUIT (D BOARD)

The horizontal cycle blanking pulse is generated by shaping the horizontal pulse with Q26 and Q28, then sending it out through Q109 and Q110. On the other hand, the vertical cycle blanking signal is input to Q27, then it undergoes AND gating with Q26 and it is output to the CA board as a composite blanking signal. In the HDTV B, a variable blanking pulse is added by Q114.

This pulse is generated as follows.

The pulse from the horizontal deflection circuit is input to Q115, the pulse from Q115 is input to the double integration circuit composed of L7 and C223 and converted into a parabola wave. The phase of this wave is changed by RV76. It passes through C224, then it is input to ③-pin of the comparator IC31 and a pulse corresponding to the voltage at ②-pin is output from IC31-⑦ pin. This pulse is added as the above-mentioned composite blanking signal, assuming a wide H size signal, e.c. (provisional MUSE specifications).

DESCRIPTION OF CONVERGENCE CORRECTION SYSTEM

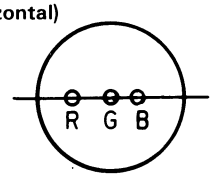
Prior to the circuit description, the convergence correction method is first described as follows.

BEAM ALIGNMET ADJUSTMENT

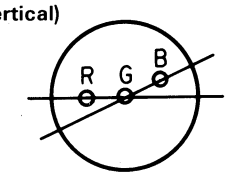
The TRINITRON employs the in-line type guns. There is possibility that the RGB beams will not go through the deflection center because of the non-uniformity in gun assembling process, or the tolerance when guns are sealed into neck. As the result, the side beams become nonsymmetrical with regard to the center beam, so that the convergence becomes difficult.

To cope with this problem, this equipment uses six pole magnet to be used for beam alignment correction. The actual alignment procedure is provided in the Alignment section.

beam nonsymmetrical (horizontal)



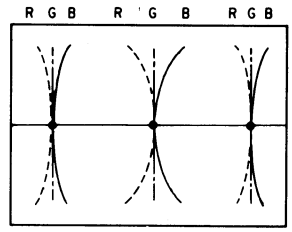
beam nonsymmetrical (vertical)



TRANSVERSAL CONVERGENCY CORRECTION

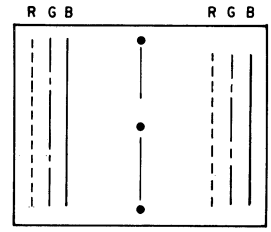
The super fine pitch TRINITRON convergence system outline is simply described as follows. The DY (deflection yoke) used in this system has an uniform magnetic field in order to avoid CRT beam spot distortion.

The CRT focus is therefore superior,but transversal convergence error as shown in Figure can happen.



Y-axis direction transversal convergence error

(When the X-axis transversal convergence error is corrected.)



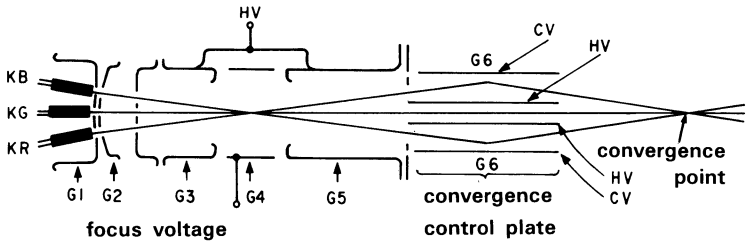
X-axis direction transversal convergence error

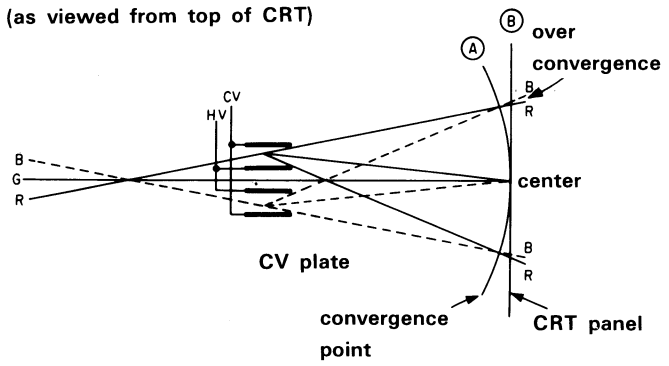
(When the Y-axis transversal convergence error is corrected.)

ELECTRO-STATIC CONVERGENCE

One of unique feature of the TRINITRON is the electro-static convergence that is described as follows. The Figure shows the gun structure. The G6 is the convergence control plate (CP) that is receiving the convergence voltage (CV 0.97×HV) from high tension supply (HV) through a high tension resistor (HVR). Since the center beam (green) receives no electric field strength, the center beam is not bent but runs straight.
However, the side beams (red and blue) are bent by the electric field produced by the G6 convergence control plates.

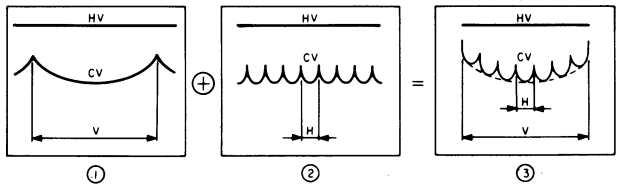
Controlling this CV voltage moves the convergence point. The electro-static system therefore is capable of convergence correction. The widely used convergence correction system employs an electro-magnetic coil, which deforms the beam shape and gives adverse effect on focus. But this electro-static system, using the CV electrode does not have such disadvanges but provides good focussing characteristics.



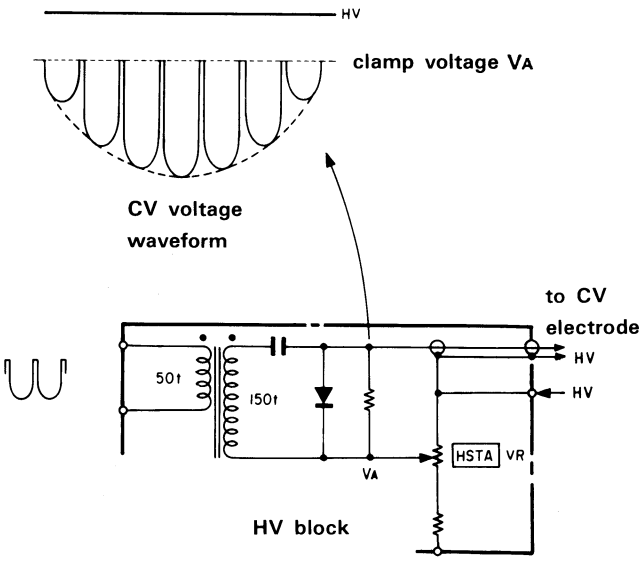


Turning back to the X-axis direction convergence error problem, the reason why the X-axis direction convergence error is generated, is described as follows. The Figure shows that the point Ⓐ is the R, G, B, convergence point when the dc convergence voltage is applied to the CV electrodes, indicating that the convergence points become cylindrical shape. However, the CRT front panel Ⓑ has nearly flat shape rather than cylindrical shape. It results that the both sides of the CRT front panel have excessive correction of convergence. This is the reason of the X-axis direction convergence error. The Y-axis direction transversal convergence error is, in the same manner as the X-axis convergence error, able to be corrected by applying the correction voltage to the CV electrodes as shown in Figure.

The above two convergence correction signals are mixed so that the mixed waveform as shown in Figure is the needed convergence correction waveform.

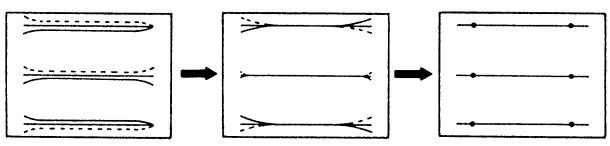


Now, since the CV electrode is receiving the very high voltage (≒29.1 kV), the DCT (Dynamic convergence Transformers) is used to transmit the convergence correction waveform in order to get insulation. Since the vertical rate voltage is impossible to transmit by use of transformer, chain of pulse are inserted during the retrace period of horizontal deflection. These pulses are peak-clamped by the diode peak clamp circuit in the DCT secondary circuit so that the correction voltage is transmitted. The Y-axis direction transversal convergence error can be corrected by changing the amplitude of these pulses.



LONGITUDINAL CONVEGENCE CORRECTION

The longitudinal-direction convergence error does not exist from the princple because the gun structure is designed as in-line. However, due to the non-uniformity in assembling the CRT and DY, and also due to the earth magnetism effect, very small amount of the longitudinal convergence error is taking place.

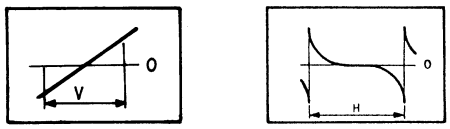


① longitudinal direction convergence error
② after corrected by NTC
③ after further corrected by CY

The longitudianl convergence error is corrected by two methods.

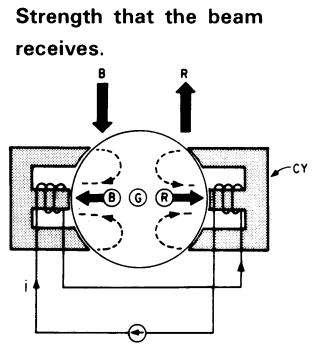
l. The longitudial convergence error along with the Y-axis (dc components) is corrected by NTC (Neck Twist Coil) as shown in Figure ② while, 2. The longitudinal covergence error in both sides (ac components) is corrected by the CY (Convergence Yoke), as shown in Figure ③.

The correction waveforms needed to carry out the convergence error correction as shown in Figure ②, ③, are the NTC and CY correction waveforms as shown in Figure ①, ②.



①NTC ②CY

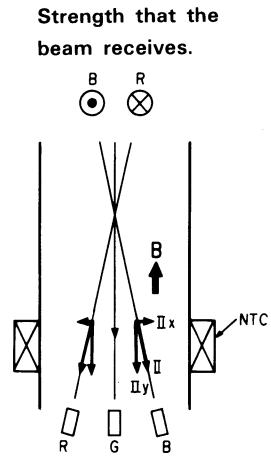
There are two CYs in HDM-2830/2830E. One of them performs the previously mentioned operation, but since a high-frequency current is sent through it (the CY is an inductance) and the blanking period is short (3.77 μs), the correction waveform is delayed, and the left side cannot be properly corrected. Therefore, a sub-CY is used for complementary correction.



(As viewed from neck end)

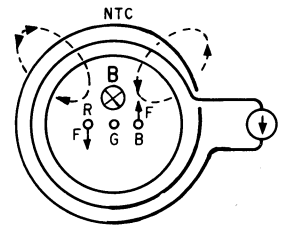
Figure shows the CY (Convergence Yoke),as viewed from the neck side. As the CY (Convergence Yoke) is generating the magnetic fluxes, it provides the physical strength toward beams as shown in Figure. The strength on the side beams area (B and R) are, as shown in Figure, generated in opposide directions each other by the CY synthesized magnetic fluxes. The one direction of strength is to raise the one beam upward direction, while the another direction is lowering the another beam downward direction.

The center beam receives no strength from the CY's magnetic fluxes because the magnetic fluxes are cancelled to zero in the center beam area. The red and blue beams moves in the vertical directions symmetrically against the green beam in the center.



(As viewed from the the top of CRT)

①



(As viewed from the CRT neck end)

②

The longitudinal convergence correction along with the Y-axis is carried out by the NTC (Neck Twist Coil). The NTC (Neck Twist Coil) has the coil winding as shown by the dotted line in Fig. ②. The NTC produces the magnetic flux as shown B in the same Fig. ①. Since the magnetic flux B is in parallel with the center beam, the center beam receives no strength, and does not move at all. The side beams' currents I and II receive strength in two directions of the Ix direction and the Iy direction as vectoranalyzed in Fig. ②. Only the Ix component alone receives strength from the NTC magnetic flux and is bent. Therefore, the red and the blue beams are shifted upwards and downwards symmetrically against the green beam by the NTC coil's magnetic flux change. This is the description of the convergence correction system. Following is the circuit description.

MODULATION WAVEFORM GENERATING CIRCUIT (D BOARD)

The convergence correction waveform is made by adding the analog correction signal and the digital correction signal.

The analog correction system provides the fifteen convergence adjusting points on the monitor screen. These are three adjusting points in the horizontal direction and five adjusting points in the vertical direction. The convergence adjusting controls (veriable resistors) correspond to the adjusting points on the monitor screen. The three horizontal convergence adjusting points are provided at five of each vertical convergence adjusting points i.e. total fifteen convertence adjusting controls are provided. Since the picture screen is divided into five blocks vertically for the convergence correction as shown in Figure the five different modulation waves as shown in Figure are prepared for vertical convergence correction.

Fig. a signal is to be used for top of picture correction,

Fig. b is to be used for top-center of picture correction,

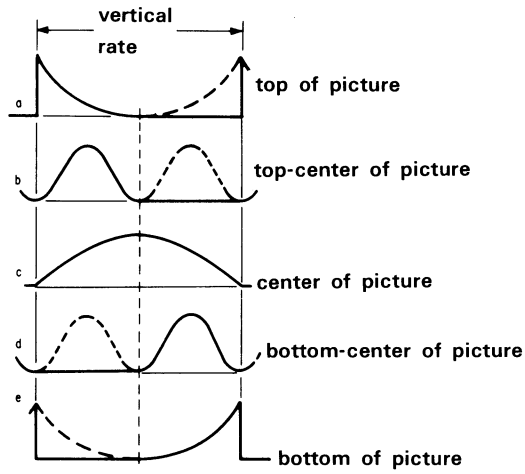
Fig. c is to be used for center of picture correction,
Fig. d is to be used for bottom-center of picture correction, and
Fig. e is to be used for bottom of picture correction.
These waveforms are generated principlely from the vertical rate parabola waveform and the half-of-vertical rate sinusoidal (sine) waveform, after they are divided.

1) V. parabola

The vertial rate parabola that is obtained from IC8- 7 pin is clamped to ground potential by the clamper circuit of Q49, Q50, and is output.

2) V/2 sine generator

The vertical rate square wave from IC18(2/2) is differentiated and shaped by Q34. Then the pulse that is 180 degrees phase apart from the vertical drive pulse (VD), is obtained. This pulse and the VD are added and are applied to the Miller integrator of IC15(2/2) as its reset pulse. Then half-of-vertical rate sawtooth weve (V/2 sawtooth wave) is obtained from the Miller integrator IC15- 1 pin output. This output is then again integrated by another Miller integrator IC19(1/2). Then the parabola waveform is obtained. The output parabola waveform is converted into sinusoidal (sine) wave by the active filter of Q40, Q43, is clamped to the ground potential by the clamper Q44, Q45, and is output. Accordingly the repetition rate of this sinusoidal wave becomes half of the vertical rate.

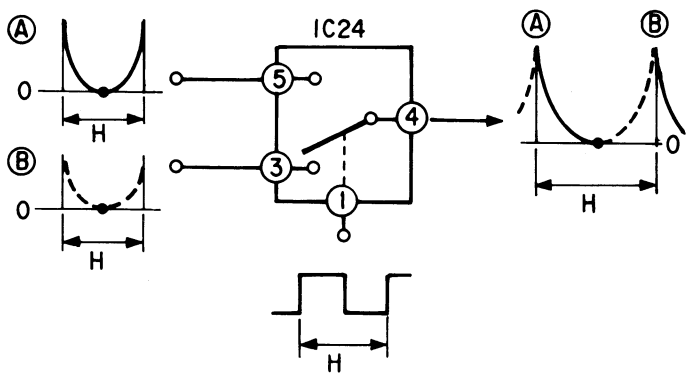


The above described three voltage waveforms are polarity inverted respectively by IC20 (2/2), IC20 (1/2) and IC 19 (2/2) so that polarity-inverted voltage-waveforms are obtained respectively. The IC18 (2/2) is the zero-cross detector. If a sawtooth wave having its average level equal to ground level, is input to this zero-cross detector, the zero-cross detector outputs 50% duty cycle square wave. This output voltage drives the analog switchers of IC23 (2/3), (3/3), and IC24 (2/3), and (3/3) respectively. These analog switchers switch the input voltage waveforms (vertical parabola and half-of-vertical rate sine wave) in vertical rate in time domain.

HORIZONTAL DIRECTION CONVERGENCE CORRECTION CIRCUIT (D BOARD)

Convergence of the left part of picture, is corrected as follows. The IC26-⑦ pin signal that is synthesized by RV37 thru RV41, is switched by the horizontal rate pulse from the horizontal deflection at Q69. This output is converted into parabola waveform by the two times intergration by L5, C139. This parabola output is amplified by Q70 and is zero-clamped by IC26 in the center of horizontal trace of picture. The clamp pulse is supplied from Q33. The clamped parabola signal is supplied from Q71 to IC24 (1/3)-③ pin. This is the convergence correction signal for the left part of picture. The convergence correction signal for the right part of picture is generated in the same manner. The convergence correction signal synthesized from RV47 thru RV51, passes through the equivalent circuit by IC27 in order to make up the correction signal for right part of picture, and is then supplied to the analog switcher, of IC24 (1/3)-③ pin. Since this analog switcher is receiving the horizontal rate control voltage input to its control pin of IC24-① pin, the correction waveform is switched during the former half and latter half of horizontal trace i.e. the right half and left half of horizontal scan of a picture are receiving different convergence correction waveform respectively.
This correction waveform output is supplied through R387 into Q66. Since Q66 is receiving also the digital correction signal through R406, Q66 provides the addition of analog and digital correction waveforms. This is the correction signal for the right side of picture. The convergence correction signal for the center of picture is obtained from RV42 thru RV46 and is output from IC25-⑦ pin. This signal is passed through R377, R380 and is input to Q65. The digital correction signal is at the same time provided through R374, and added to the analog correction signal so that the digital and analog correction signals are added and input to Q66. This output signal is converted into a chain of pulse signal as Q31 pulse is input to D15.

Accordingly, the horizontal convergence correction signal from Q68 is the voltage waveform that is the addition of Q65, Q66 and is output from Q68.



VERTICAL DIRECTION CONVERGENCE CORRECTION CIRCUIT (D BOARD)

The vertical direction convergence correction circuit, in the same manner as the horizontal direction convergence correction circuit, picks up the waveforms from RV22 through RV26 and RV32 through RV36. These waveforms are clamped to the zero potential in the center of horizontal scan. The left half and the right half of scan have the different waveforms as switched by IC23(1/3), and are buffered by emitter followers Q59, Q60, and are output. The digital correction waveform is supplied through R301 and is added to the analog correction waveform at Q59. The vertical direction convergence correction for the center of scan is mixed by RV27 through RV31 and amplified by IC25(1/2), Q63, Q64 current amplifier, and drive the NTC. The digital correction waveform is added through R347, at IC25. Furthermore, the waveform from the circuit including RV22 to RV26 (which incorporates an auxiliary circuit to make up for insufficient correction of the left side) is converted into a pulse train by Q51, it passes through IC32 and the amplifier composed of Q117 and Q118, then it is output to the E board. This becomes the sub-CY correction waveform.

VERTICAL DEFLECTION OUTPUT CIRCUIT (E BOARD)

The vertical deflection sawtooth wave and the top/bottom of scan pin-cushion correction waveforms are input the differential amplifier Q9, buffered by Q12, amplified by Q10, Q11, Q13, Q14 the SEPP complementary amplifiers, and drive the vertical deflection yoke. The top/bottom of scan pin-cushion correction transform T3 (VPT), that is connected to the output terminal of the vertical deflection transformer, picks up only the horizontal rate top/bottom pin-cushion correction waveform, steps up this waveform, and modulates the deflection yoke current by its secondary winding. The R45, R46, R47, that are connected to T3, are the damping resistors for T3 and the vertical deflection yoke, that improves the deflection at the top of picture. The resistor R49, that is connected to the bottom of VPT's secondary winding, detects the deflection; yoke current, and applies negative feedback (NFB), in order to improve the deflection waveform. The thyristor D15 is turned ON, as it receives the vertical deflection yoke's fly-back pulse during the vertical retrace period through R41, C12 to its gate, so that the deflection current linearity is improved by introduing the high tention voltage during the retrace period. The inductance L7 in the D15 anode circuit converts the sharp current change in the thyristor ON transient, into the resonant current by L7, C20 so the thyristor D15 will surely turned OFF when the thyristor triggering current becomes lower than its keep current.

HORIZONTAL DEFLECTION OUTPUT CIRCUIT (E BOARD)

The left, right sides' pin-cushion correction is performed by modulating the power supply voltage of the horizontal deflection circuit. This pin-cushion correction is executed by the circuit of IC1, Q1, Q2, Q3. Q2 is the output transistor while IC1 is the error amplifier. The left/right pin-cushion correction waveform from D board and the picture size determining dc voltages are introduced to IC1 ⑤ pin. The IC1 ⑥ pin is the detect voltage by R9 through R11.

The horizontal drive pulse from the D board is introduced to Q4 that drives the horizontal drive transformer T1 (HDT). The horizontal drive transformer T1's secondary circuit is connected to the horizontal deflection output transistor Q5 through R17 and the speed-up diode D3 that is switching Q5. The Q5 collector circuit is connected to the horizontal deflection yoke, the resonance capacitor C10, C11, C98, C99 and C100 and the damper diodes D4, D60, D61 and D80. The Q5 collector circuit is also connected to the left, right pin-cushion correction power supply that is fed from the horizontal output transformer T3 (HOT).

In the prog mode, the horizontal frequency f_H drops. The peak voltage Vcp of the flyback pulse is as follows:

$$Vcp = E\{1 + \pi/2\ (1/f_H\ Pw - 1)\}$$

E: power supply voltage
PW: flyback pulse width
Thus, Vcp rises when fH drops, and Q5 may be damaged. To prevent this, turning on Q24 is the prog mode short-circuits C11 and C99, expands Pw, and lowers Vcp.

One of the secondary windings of the horizontal output transformer T2 (HOT) generates the horizontal position adjustment power at D6 and D7, and performs horizontal position adjustment by means of Q6 and Q7. The other secondary winding is a pulse winding used for dynamic focus. The signal it generates is converted into a parabola wave at the circuit composed of L3 and C90, then sent into the T4 DFT.

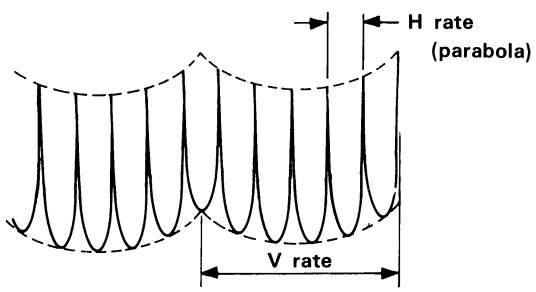
The horizontal deflection current that flows through the horizontal deflection yoke, also flows through the horizontal linearity coil L2 (HLC) and the S-shape distortion correction capacitor C16, C107. Since the linearity coil L2 (HLC)'s inductance changes in accordance with the amount of current flowing, the left, right sides of picture linearity is improved. The capacitor C16 and C107 corrects the linearity difference between the center of picture and both sides of picture.

DYNAMIC FOCUSSING CIRCUIT (E BOARD)

The transformer T2 (HOT) provides the horizontal pulse output voltage that is integrated by L3, C90, and is again integrated by the primary winding of the dynamic focus transformer T4 (DFT), so that the secondary winding generated approximately 800 Vp-p parabolic voltage. The transistor Q34 amplifies the IC10 ⑦ pin (D board) output vertical rate parabolic voltage up to approximately 250 Vp-p.

Since T4's secondary winding is connected to the Q34 output circuit, the another end of the T4's secondary winding supplies the dynamic focus waveform that is the addition of the horizontal rate parabola signal and the vertical rate parabola signal. This dynamic focus signal is fed to E-6, to the K board, to the capacitor C1, and then to the FOCUS adjusting variable resistor so that the focus voltage is modulated.

The AFC pulse is rectified by D18, C28 that generates approximately −300V power that is supplied to Q34.



VERTICAL DIRECTION CONVERGENCE OUTPUT CIRCUIT (E BOARD)

The vertical direction convergence correction waveform from the D board passes through the current amplifier circuit composed of Q22, Q23, and Q25 through Q28, and is then sent to CY. On the other hand, the auxiliary vertical direction convergence correction waveform passes through the current amplifier circuit composed of IC8, and Q44 through Q47, and is then sent to the sub-CY.

HORIZONTAL DIRECTION CONVERGENCE OUTPUT CIRCUIT (E BOARD)

The horizontal-direction convergence correction waveform from the D board passes through the voltage amplifier circuit composed of Q16 to Q21, then it is sent into the DCT transformer.

"EHT" REGULATOR CIRCUIT (E BOARD)

The horizontal drive pulse, that is supplied from the terminal E3, is amplified by Q29, Q30, coupled by T5 (CDT), and drives the high voltage output amplifier Q31. This transistor Q31's collector has C47, D29, T6 (LOT), and (after passing through the K board) the fly-back transformer (FBT). This circuit operates in exactly same manner as the horizontal output circuit.

The +B power is supplied through T6. The FBT is the multi-singular type transformer, having six rectifying diodes in the secondary circuit. The second tap of the FBT supplies the focus voltage.

The highest voltage of the FBT is the high tension output that is routed through the HV block, and to the CRT anode. The high tension output is, at the same time, divided into 1/3570 voltage by the high tension resistor network, and is supplied to the connectors E17 ③ pin and to E17 ⑤ pin. The 1/3570 divided high tension voltage, appearing at the connector E17 ③ pin is used as the high tension's error voltage detection signal which is passed through the buffer IC3(2/2), and to the error amplifier IC3(1/2) where the high tension's error voltage is compared with the reference voltage (VRV=8.95V). The comparison output is amplified and drives the differential amplifier IC4 ⑤ pin.

Since the IC2 ⑦ pin is connected to the IC4 ③ pin, the IC4 ① pin repeates the on, off operation that charges the C62, that is forming the sawtooth generator. The IC4(1/2) is the pulse width modulation (PWM) circuit. The pulses that is generated at the IC4 ⑦ pin is buffered by Q32, and then gates D57. This circuit thus enables to control the back pulse's energy generating at anode of Q57, that is namely controlling the energy to the FBT. This is the "EHT" regulator circuit operation.

This EHT regulator is generating, at the same time, the various outputs such as ±22V output (used for vertical output circuit), +30V (used for CY drive) from T6 (LOT), 6.3V (for heater), −120V (used for G1 bias), etc.

HIGH VOLTAGE HOLD-DOWN CIRCUIT (E BOARD)

The feed-back voltage that is supplied from the HV block, **appearing at the terminal E-17 ⑤ pin is normally 8.40V. This** signal is input to the comparator IC5(2/2) ⑤ pin so that it is compared with the another input voltage at IC5 ⑥ pin input. The voltage value of the VHV signal is determined by R140, **R141 so it will be 8.90V±0.05V. Therefore, IC5(2/2) ⑦ pin** output is normally "LOW". However, if the high voltage should increase abnormally by some accident until the IC(2/2) ⑤ pin + input voltage exceeds the VHV voltage, the IC5(2/2) ⑦ pin output becomes "HIGH", that turns on the thyristor D45. Since the D45 anode is connected to the high voltage convertor drive IC2, the high voltage is held-down as the D45 is turned on to remove the high voltage drive pulse.

The high tension voltage value is calculated by the following equation to start the hold-down operation.

$$\text{HV (PRT)} = 8.90\ (\pm 0.05\%) \times 3750\ \left(\begin{matrix}+3\% \\ -1\%\end{matrix}\right) = 31.8\ \begin{matrix}+1.1 \\ -0.5\end{matrix}\ \text{kV}$$

BEAM PROTECTOR CIRCUIT (E BOARD)

If the CRT anode current should increase abnormally by some accident, This beam protector circuit stops the generation of the high voltage which is a kind of the ABL circuit. This equipment has two beam protectors.

The anode current detection method is through the use of detector resistor that detects the FBT's secondary current (which is the addition of the CRT curent + high tension resistor's current + focus resistor current). The detected signal is in the form of voltage signal. The detector resistors are R134, R135, R136, R182. As the ABL current flows, the connector E-17 ⑦ pin voltage is decreased. Since the current flowing through the high tension resistor and focus resistor, which is the bleeder current, is constant,the abnormal increase of CRT current decreases the IC5(1/2) ③ pin ⊕ input voltage lower than its ② pin ⊖ input voltage (VRV). Therefore the IC5 output becomes LOW. Since the IC2(2/2) forms a hysteresis comparator, its output is kept LOW which stops the high tension comparator drive IC2(2/2) through D43. This is the beam protector-1 operation.

The D44 cathode is connected to the terminal E-17 ⑦ pin (ABL) at the same time. If the beam protector-1 should not start operating by some accident, the D44 conducts in turn, that decreases the IC6(2/2) ⑤ pin input voltage. As the IC6(2/2) ⑤ pin + input volage becomes lower than its ⑥ pin − input voltage, its IC6 ⑦ pin output becomes "HIGH" to "LOW", that drives the diode D54 into conduction. Therefore, the IC2 output is cut-off to stop generation of the high voltage. This is the beam protector-2 operation.

CRT (CATHODE RAY TUBE) PROTECTOR CIRCUIT (E BOARD)

If the deflection circut should fail to operate and should stop to scan, it will result in burning of fron phospher plate of the CRT. In order to avoid the phospher burning, the high tension circuit operation is stopped as soon as the horizontal deflection output or the vertical deflection output is stopped its operation. The horizontal and the vertical deflection output is detected as follows.

The horizontal deflection circuit T2 (HOT)'s secondary pulse is rectified and smoothed out by D46, C76 to be converted into the dc voltage that is supplied to the IC6(2/2) ⑤ pin. Since the IC6 ⑥ pin is receiving dc 6V from the D48, stoppage of the horizontal deflection decreases the ⑤ pin voltage lower then the ⑥ pin voltage so that the IC6 ⑦ pin output is set "LOW" that stops the high tension drive operation through D54.

The vertical deflection circuit has the same operation. The vertical deflection output pulse is converted into dc voltage by D50, C80 that is connected to IC6 ③ pin. If the vertical deflection should stop, the ③ pin voltage becomes lower than ② pin voltage so that the output IC6 ① pin becomes "LOW" that stops the high tension.

The C78, R170 are used for prevention of errorneous operation of this protector circuit when the power switch is turned on.

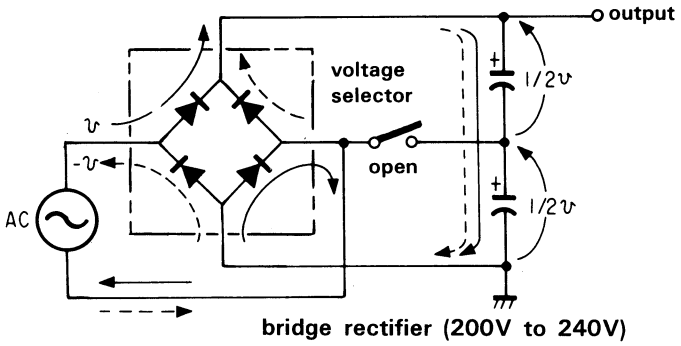
LINE FILTER CIRCUIT (F BOARD)

The line filter is made from the F board T1, T2, C1, and C3 thru C6. The input circuit of this filter is connected to the AC INLET (CNP901).

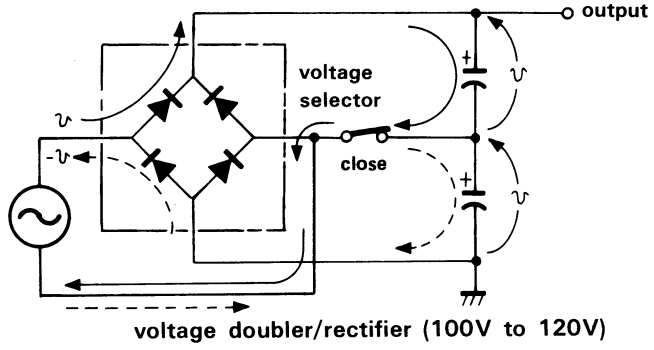
AC POWER LINE VOLTAGE SELECTION (F BOARD)

The ac power line voltage selection is made by the voltage selector (S902). Either the voltage doubler rectifier or the full wave rectifier is at the same time selected by the voltage selector. AC100V to AC120V or AC220V to AC240V input line voltage can be used by selecting the proper position of the voltage selector.

Ac power line selection



bridge rectifier (200V to 240V)



voltage doubler/rectifier (100V to 120V)

DEGAUSSING CIRCUIT (F BOARD)

The degaussing coil is used when CRT is going to be demagnetized. The demagnetization is done by the degaussing coil (L901) that has the posistors connected in series. The ac alternating damping curring is flown through the degaussing coil for demagnetization. The relay (RY-1) in the F board and the transistors Q1, Q2 in the GA circuit board flow the degaussing current automatically during the initial few seconds after POWER switch is turned on. When the front panel degauss button is pressed, the current also flows in the same manner. The posistors are selected for ac 100V-120V use (5 ohms) or ac 220V-240V use (30 ohms) by the voltage selector operation.

EXCESSIVE AC INPUT VOLTAGE PROTECTION CIRCUIT (F BOARD)

If the excessive input voltage is applied to the ac power input line, or if the voltage selector's setting is errorneously made and the power switch is turned on by mistake, the protection circuit of D1 etc.,in the GA board starts operating to blow the ac fuse (F901). The circuit is designed to start operating when the ac input voltage of approximately 14% or higher voltage than the specified voltage that is rated by the voltage selector is input.

±12V POWER SUPPLY (GA BOARD)

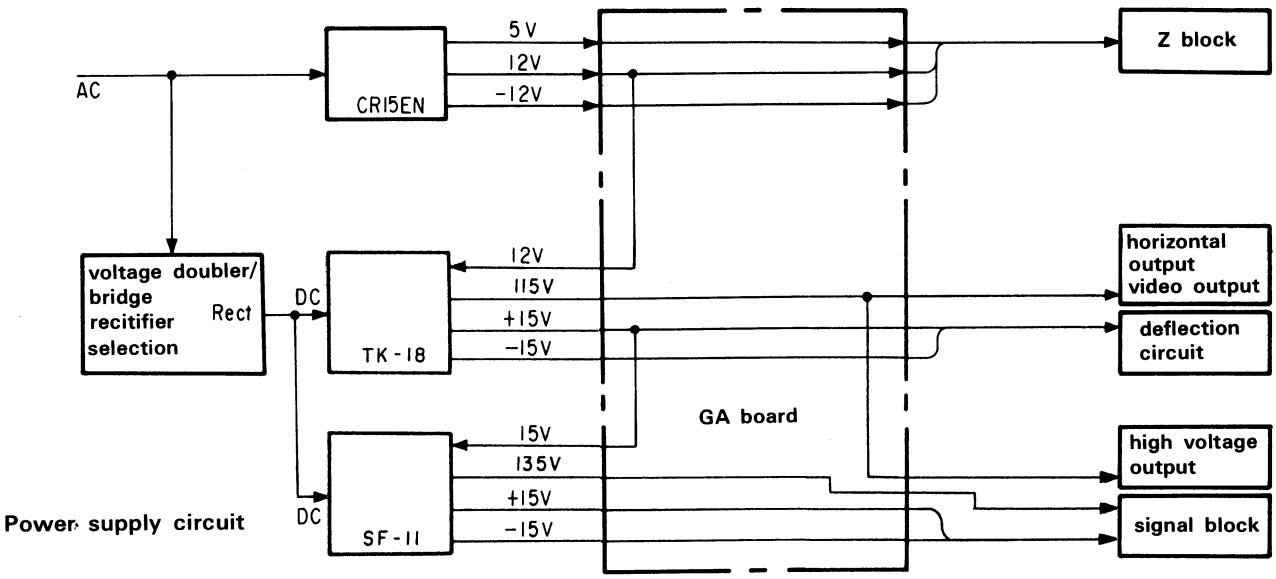
The ±12V power is supplied from the three terminal regulator IC1, IC2, IC3, IC4, and distributed to each circuit boards.

POWER SUPPLY

This power supply has the three types of switching power supplies (CR15EN, SF11, and TK18).

The AC input voltage is directly input to CR15EN. The DC voltage that is rectified by the D2 of the F board is input to SF-11 and TK18.

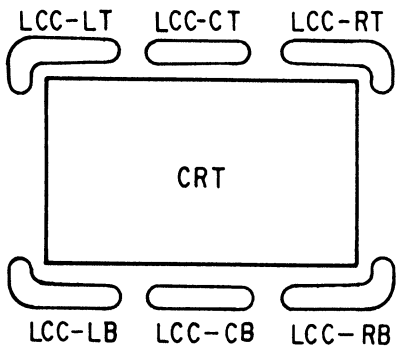
When the power switch is turned on, the CR15EN starts to output 5V and ± 12V. This 12V becomes the starting power supply for the TK-18 that generates 115V and ± 15V. This 15V becomes also the starting power supply for SF-11 that generates 135V and ± 15V. These voltages are distributed to each circuit board at the GA board.



BEAM LANDING CORRECTION CIRCUIT (R.W BOARD)

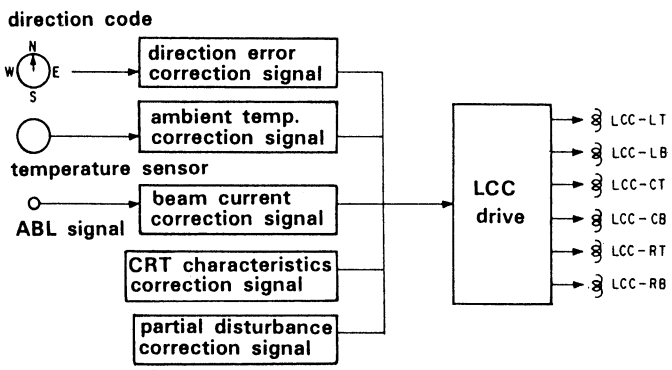
This monitor is equipped with the six pieces of the beam landing correction coils (LCC=Landing Correction Coil) around the circumference of the CRT. The optimum beam landing is maintained by flowing the appropriate correction current. This beam landing correction is applied to the following points.

1. Landing correction that is generated by the direction of monitor installation (horizontal earth's magnetism).
   Note: This circuit does not correct for the vertical earth's magnetism. It is corrected by the purity magnets inside.)
2. Correction for the landing change due to change in ambient temperature.
3. Correction for the landing change due to change of beam current in average.
4. Correction for the landing change due to specific CRT's landing characteristics.
5. Correction for the landing change due to partial disturbance of the ambient magnetic field.



(As viewed from CRT end)

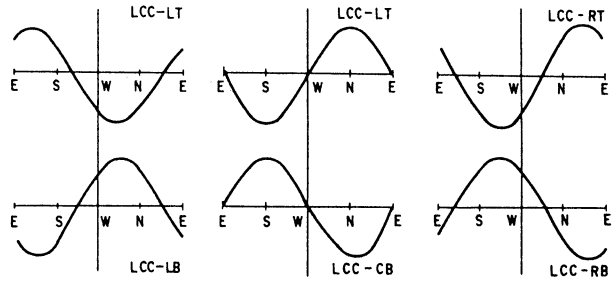
Fundamental correction circuit of the landing correction system is shown as follows. Explanation is discussed block by block.



Fundamental block diagram

Direction Correction Signal

As the monitor is installed, it receives the effect of earth's magnetism. The effect of the earth's magnetism is different depending on the direction of the moniitor installed. The beam landing receives its effect and the landing change due to the earth's magnetism change corrected by determining the polarities of the six pieces of the LCCs respectively. Flowing the six different ac sinusoidal electric currents through the six LCCs respectively as shown in Figure. 3, can correct the beam landing error due to the earth's magnetism.



Direction correction current for LCC

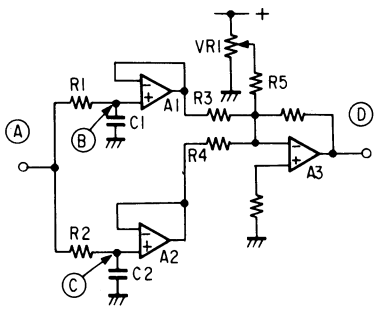
This system has the digital memory that memorizes the direction data for every 1/16th direction. These digital data are memorized in IC3 memory as shown in Figure. 4 and are supplied to the coils of LCC-LT and LCC-RB only. The switch S1 in the W board provides the 4 bit direction data that corresponds to the ROM addresses A0 through A3. The least address A4 receives 0 and 1 output alternatingly at vertical rate, which is supplied from IC2 ⑦ pin. Thus the landing correction data are obtained from ROM and determined by S1, and are supplied to the dual D/A convertors of IC4 where data are latched. These are dual data for LCC-LT and for LCC-RB. These two digital data are fed to the IC4 dual D/A convertor alternatingly at vertical rate. The analog converted data are then buffered and output to the LCC driver circuit as the landing correction signal. The LCC-LB and LCC-RT correction signals are obtained by reversing the LCC-LT and LCC-RB signal with IC5(2/2) and IC6(2/2).

Amplitude of these waveforms can be adjusted by shifting the D/A convertor's reference voltage with RV1, depending upon the strength of earth's magnetic field effect. The LCC-CB correction signal is obtained by adding both the LCC-LB and LCC-RT correction signals by IC7(1/2). The added output is further inverted to produce the LCC-CT correction signal. Amplitude of these signal waveforms can be adjusted by RV2, and adjusted depending upon the strength of horizontal earth's magnetic field effect.

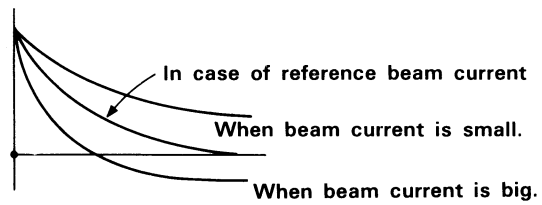
Direction	Address					Data
	A4	A3	A2	A1	A0	
North	0	0	0	0	0	LT0
	0	0	0	0	1	RB0
North/North/East	0	0	0	0	0	LT1
	0	0	0	1	1	RB1
Northeast	0	0	1	0	0	LT2
	0	0	1	0	1	RB2
⋮	⋮	⋮	⋮	⋮	⋮	⋮

Beam Current Correction

If the average beam current changes, the CRT's internal mechanical components are affected by average beam current change so that the CRT's internal mechanical components are thermally deformed. Therefore, the beam landing characteristics is also affected. The correction signal for the thermal change is generated by the use of the RC's integral characteristics, as shown in Figure.



(a)



(b)

The Figure. point Ⓐ is receiving the input voltage that corresponds to the average beam current. This input voltage is produced by the IC11, using the E board's ABL signal. The point Ⓑ and the point Ⓒ have the integrated output voltage that are fed to the voltage followers of A1 and A2. These output are inverted and added to make the output at point Ⓓ. The R1, C1 in Figure. provide longer time constant while the R2, C2 provide shorter time constant. The longer time constant produces the slower curve as shown in Figure. while the shorter time constant produces the sharper curve. These two curves are mixtured to provides the output correction signal. The adjustment VR1 is the level-shift that is adjusted so that the correction output becomes 0 when the average beam current is present. The output at point Ⓓ is further attenuated by other resistors so that the optimum correction amounts are provided for respective corners, and then applied to respective LCC drive circuits.

The practical circuits have the two types of pre-determined typical curve of landing drift so that the most closest curve is selected and applied to respective corners.

CRT Characteristics Correcton Signal

Each CRT is placed in the standard ambient temperature, flowing the reference beam current, and waits until the CRT operation is stabilized. The beam landing correction is performed under this conditons by adjusting the W board's six adjustments from RV7 through RV12. These six adjustments correspond to the respective LCCs. The output of these adjustments are the landing correction signals for the specific CRT. If these adjustments are altered, the landing correction signals are also changed its correction amount.

Partial Correction Signal

When the monitor is installed, there may be occasion that the direction correction cannot cover the landing error fully. Then the most precise landing correction adjustments are provided by this partial correction system.

Respective six LCCs are equipped with the adjustments of RV1 through RV6 on the W board, that are used for the partial correction of the landing error. Each outputs are connected to the analog switches of IC1, IC2 so that each correction circuits can be switched on or off by the switch S3 depending upon the need for partial landing correction.

LCC Drive Block

Each correction signals are added by the sum amplifiers that are connected to the analog switches of IC19, IC20, and then applied to the constant current circuit consisting of operational amplifier and complementary output circuit. These analog switches of IC19, IC20 stops flowing the current through the LCC during when the internal degaussing is operating and during when the switch S2 of the W board is in off position.

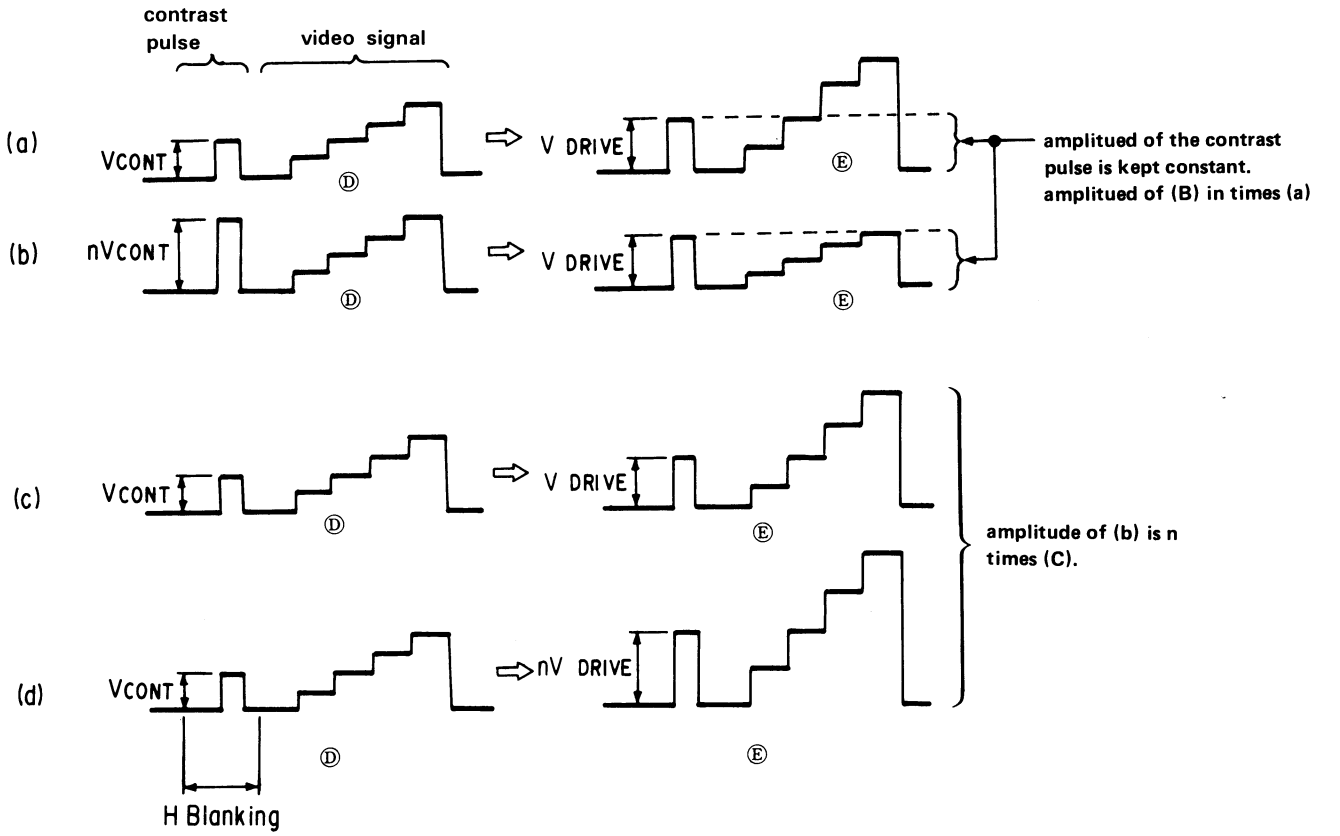
GAIN (Drive) and CONTRAST Control Circuit (B_G, B_D BOARD)

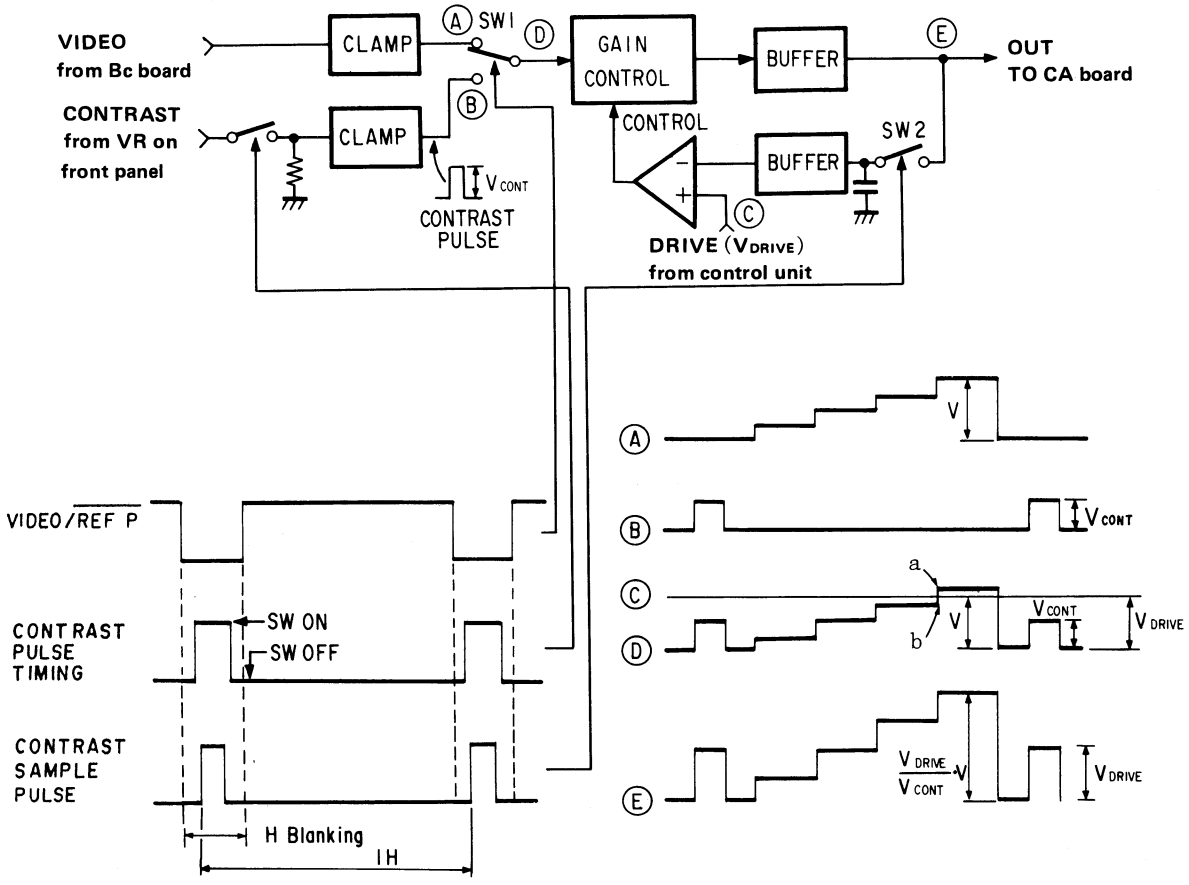
The Drive and the Contrast are controlled by the B_G board and the B_D board. Each circuit descriptions are discussed in latter section. Here the control method of the Drive and Contrast are discussed.

The Drive and the Contrast are controlled by the contrast pulse that is inserted during the horizontal blanking period. This method can remove the adverse effect of the amplifier gain's drift etc., that results in the contrast change and in the white peak's color temperature change. This constrast pulse is generated by the B_G board. Amplitude of the contrast pulse is determined by the front panel CONTRAST control. The contrast pulse is routed to the switch SW1 of the B_D board. This switch SW1 is operated in the timing as shown in the following illustration so that the contrast pulse is inserted in the horizontal blanking period. The switch SW1 outputs the video signal Ⓓ that has the contrast pulse inserted. This output signal is routed through the gain control buffer and then output to the C_A board. Amplitude of this output contrast pulse is sampled by the swtich SW2 and is then compared with the drive voltage V_{DRIVE} that is pre-set by the control unit located inside the drawer. The error voltage output from the comparator circuit becomes the control signal of the GAIN CONTROL. The gain control operation is performed until the contrast pulse amplitude is equal to that of the V_{DRIVE} signal. The gain is V_{DRIVE}, V_{CONT}. If either the V_{DRIVE} is multiplied by n times or the V_{CONT} is multiplied by (1/n), the output signal is multiplied by times n. The V_{CONT} is adjusted by the front panel CONTRAST control and the V_{DRIVE} is adjusted by the control unit.

The relationship between the input signal and the output signal (Ⓓand Ⓔin the block diagram) of the GAIN CONTROL, when the Contrast and the Drive are adjusted, is shown in the illustration.

The (a) and (b) show the case when the V_{CONT} is multiplied by n times while the V_{DRIVE} is kept constant. The (c) and (d) show the case when the V_{DRIVE} is multiplied by n times while the V_{CONT} is kept constant.


contrast pulse
video signal
(a)
VCONT
Ⓓ
V DRIVE
Ⓔ
amplitued of the contrast pulse is kept constant.
amplitued of (B) in times (a)
(b)
nVCONT
Ⓓ
V DRIVE
Ⓔ
(c)
VCONT
Ⓓ
V DRIVE
Ⓔ
amplitude of (b) is n times (C).
(d)
VCONT
Ⓓ
nV DRIVE
Ⓔ
H Blanking


VIDEO
from Bc board
CLAMP
Ⓐ SW1
Ⓓ
GAIN CONTROL
BUFFER
Ⓔ
OUT
TO CA board
CONTRAST
from VR on
front panel
CLAMP
Ⓑ
VCONT
CONTRAST PULSE
CONTROL
BUFFER
SW2
Ⓒ
DRIVE (VDRIVE)
from control unit
VIDEO/REF P
CONTRAST PULSE TIMING
SW ON
SW OFF
CONTRAST SAMPLE PULSE
H Blanking
1H
Ⓐ
V
Ⓑ
VCONT
Ⓒ
a
b
Ⓓ
V
VCONT
VDRIVE
Ⓔ
VDRIVE / VCONT
V
VDRIVE

Bias and Bright Control Circuit (B_G, C_A BOARD)

The Bias and Bright control operations are performed in the B_G board and the C_A board. Respective circuit description is discussed later. Here the Bias and Bright control methods are described.

The Bias and Bright controls are performed by using the bright pulse that is inserted during the vertical blanking period, and finally by controlling the cathode current. This system of the bias and bright control circuit removes change in the black balance that is due to the temperature drift of circuits and CRT or due to change with elapsed time.

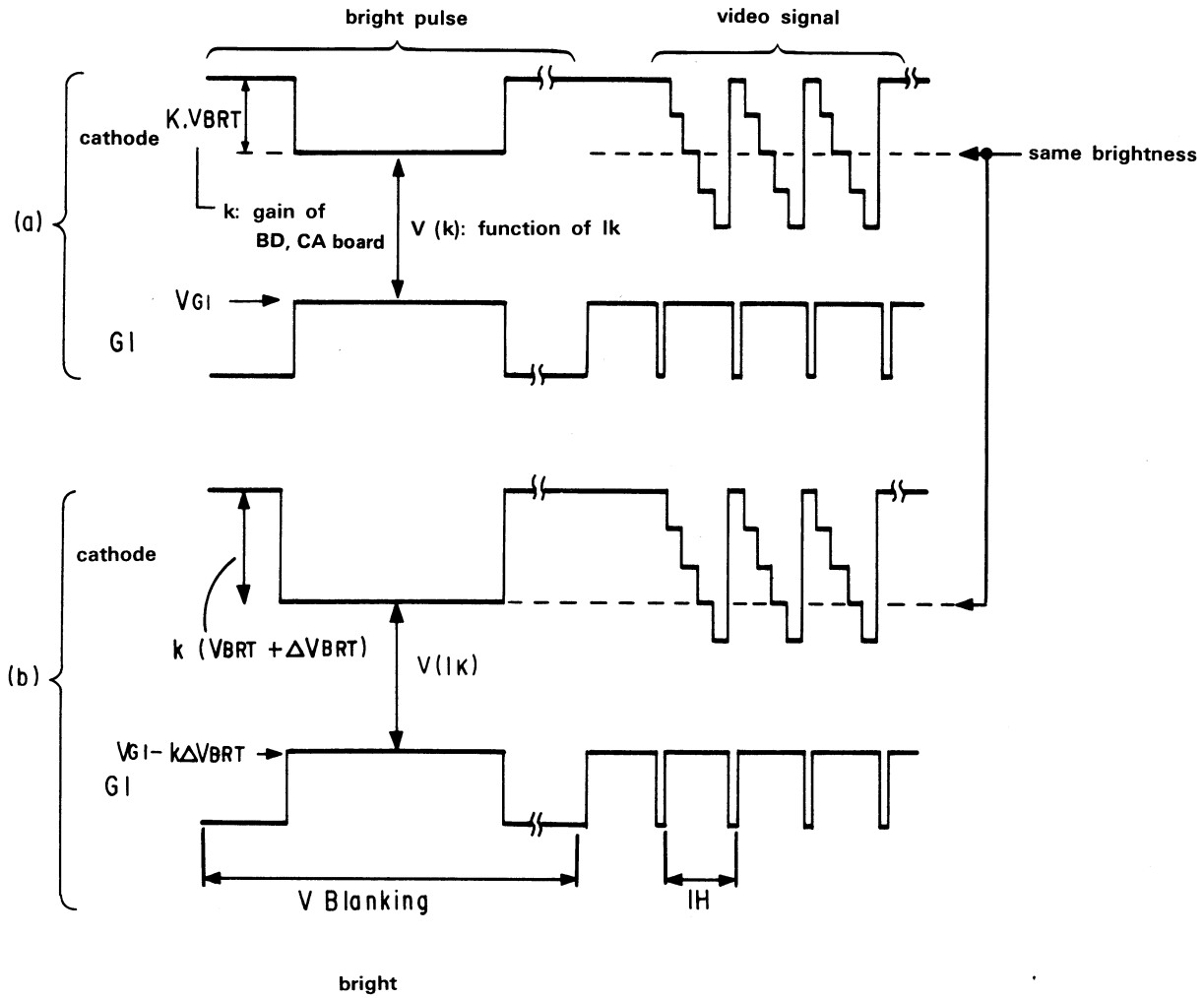
The bright pulse is generated in the B_G board. Amplitude of the bright pulse is determined by the front panel BRIGHT control. The bright pulse is mixtured with the contrast pulse, and then are input to the B_D board's switch SW1. The switch SW1 performs switching as shown in the following illustration so that the video signal with the bright pulse inserted in the vertical blanking period is output as Ⓓ in the illustration.

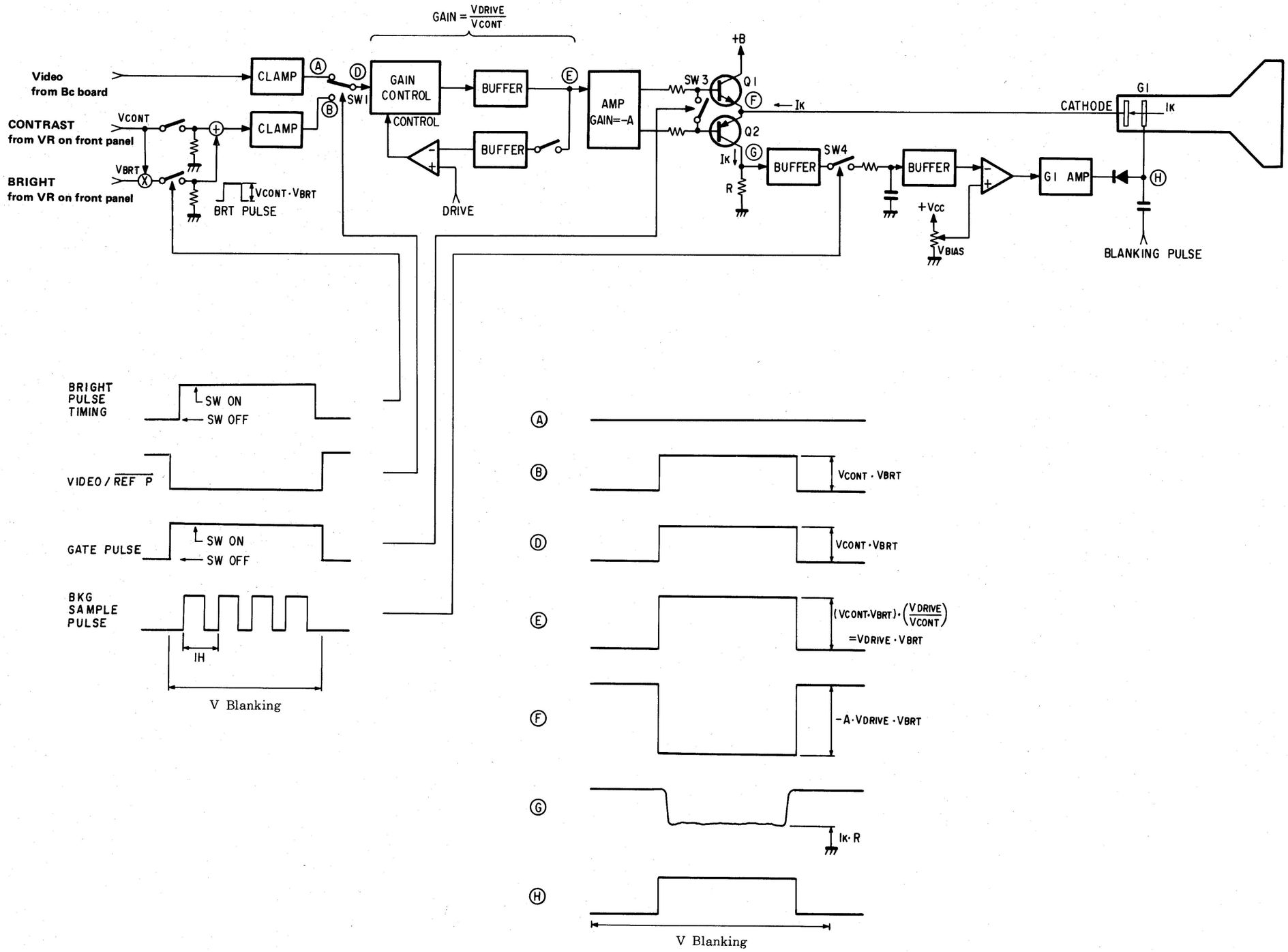
This video signal is buffered by the gain control buffer amplifier, and then output from Q1/Q2 that drive the CRT cathode. The switch SW3 is turned on during the bright pulse period. During the SW3 on period, Q1 is cut-off so that the cathode current Ik which is proportional to the bright pulse amplitude, flows through Q2 collector. This current Ik is converted by a resistor to voltage signal that is sample-held by the switch SW4. The voltage difference between this voltage (Ik.R) and the V_{BIAS} is amplified and sent to the CRT's G1 in order to control the Ik. When the (Ik.R)is bigger than V_{BIAS}, the G1 voltage decreases to reduce the Ik. This feedback loop operates in this manner until the stable state of $(Ik.R)=B_{BIAS}$ is established. As long as the B_{BIAS} is of constant value, the Ik which is the brightness of the CRT is kept constant.

Brightness of the CRT can be controlled by changing the amplitude of the bright pulse. As the front panel BRIGHT control is turned from B_{BRT} as shown in the following illustration to V_{BRT} + delta V_{BRT} as shown in b in the following illustration, the monitor screen is darkened.

The bias adjustment is done by changing the V (Ik).

(Since $Ik=V_{BIAS}/R$, the Ik can be controlled by V_{BIAS}.)




GAIN = VDRIVE / VCONT
Video from Bc board
CLAMP
A
D
SW1
GAIN CONTROL
CONTROL
BUFFER
E
AMP GAIN=-A
SW3
+B
Q1
F
Ik
CATHODE
G1
Ik
CONTRAST from VR on front panel
VCONT
CLAMP
B
BUFFER
Q2
G
Ik
R
BUFFER
SW4
BUFFER
G1 AMP
H
BRIGHT from VR on front panel
VBRT
VCONT·VBRT
BRT PULSE
DRIVE
+Vcc
VBIAS
BLANKING PULSE
BRIGHT PULSE TIMING
SW ON
SW OFF
VIDEO / REF P
GATE PULSE
SW ON
SW OFF
BKG SAMPLE PULSE
1H
V Blanking
A
B
VCONT · VBRT
D
VCONT·VBRT
E
(VCONT·VBRT)·(VDRIVE / VCONT)
=VDRIVE·VBRT
F
-A·VDRIVE·VBRT
G
Ik·R
H
V Blanking

FLOATING TYPE INPUT BUFFER (QA, QB, QC BOARD)

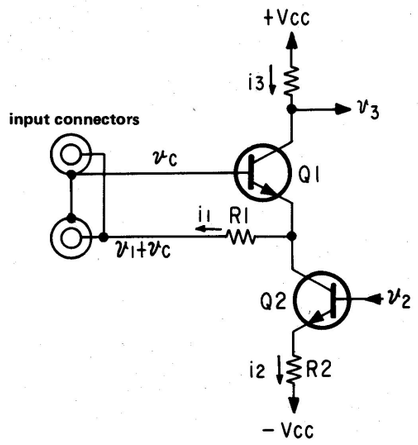
The captioned three circuit boards are connected to the BNC input connectors, having the input buffer function.
These three boards receives power supply from the BA board. As input signal is selected by the INPUT A, B select switch, etc., the selected circuit board alone receives power supply while the other circuit boards receive no power as power is turned off by the input selector switch.

R, G, B, EXT SYNC channels' Input Buffer

The input buffer circuit comprises the input stage Q1, Q2, the cascode connected high gain amplifier Q3, Q4 and the emitter follower. The negative feedback is applied to form the wide band-width amplifier.

Input Stage

The input signal (v1+vc) is applied to Q1 emitter through R1 while the ground (vc) of the input signal is connected to Q1 base. This circuit configuration can remove the common mode noise of the input signal. The output signal (v2) from the output buffer is fed back to Q2 base. Gain is shown in the equation 1 .



$$i_1=\frac{v_C-(v_1+v_C)}{R_1}=-\frac{v_1}{R_1}$$

The voltage across R1 becomes V1.
(Vc is removed.)

$$i_2=\frac{v_C}{R_2}$$

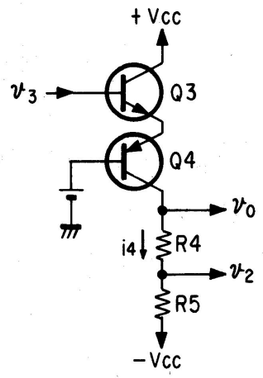
$$i_3=i_1+i_2$$

$$v_3=-i_3R_3$$

$$=\frac{R_3}{R_1}v_1-\frac{R_3}{R_2}v_2 \quad \cdots\cdots ①$$

High gain amplifier

The input signal v3 is input to Q3 base. Output is obtained from Q4 collector.
Gain of this stage is shown in equations ②, ③ .



If the emitter resistors of Q3, Q4 are "re",

$$re=\frac{kT}{q}\frac{1}{I_C}=\frac{26\times10^{-3}}{I_C}\ [\Omega]$$

$$i_4=\frac{v_3}{2re}$$

$$v_0=i_4(R_4+R_5)$$

$$=\frac{R_4+R_5}{2re}\cdot v_3 \quad \cdots\cdots ②$$

$$v_2=\frac{R_5}{2re}\ v_3 \quad \cdots\cdots ③$$

Output Buffer's total gain

The v2 and v3 are removed from the above calculated equations ①, ② , ③.

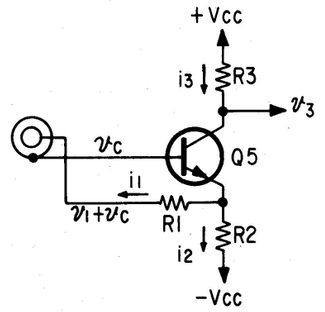
$$v_0=\frac{R_3}{R_1}\frac{R_4+R_5}{2re+\frac{R_3}{R_2}\cdot R_5}v_1$$

$$=\frac{R_2}{R_1}\left(1+\frac{R_4}{R_5}\right)\cdot v_1 \quad \left(\because 2re\ll\frac{R_3}{R_2}\cdot R_5\right)$$

Since R1=13 kohms, R2=4.7 kohms, R4=2.2 kohms and R5=1 kohms, the gain is unity (=1) gain.

HD, and VD channels' Input Buffer

The input buffer consists of the input stage Q5 and an emitter follower.
Following is the description on the input stage.



$$i_1=\frac{v_C-(v_1+v_C)}{R_1}=-\frac{v_1}{R_1}$$

$$i_2=\frac{v_C}{R_2}$$

$$i_3=i_1+i_2$$

$$v_3=-i_3R_3$$

$$=\frac{R_3}{R_1}v_1-\frac{R_3}{R_2}v_C$$

$$=\frac{R_3}{R_1}v_1 \quad (\because R_3\ll R_2)$$

Since R1=680 ohms and R2=1.5 kohms, the gain is 2.2 times.

INPUT SIGNAL SELECTION (BA BOARD)

The BA board has function of selecting the input signal and also the power supply control for QA, QB, and QC boards.
The A-channel video signals (R/CW, G/Y, and B/CN) from the QA board and the B-channel video signals (ditto) from the QB board are input to IC101/IC102/IC103 (LA7016) where either A-channel or B-channel is selected. The selected output video signal from these switching ICs, is buffered by Q101, Q102, Q103, is output from the BA board and is input to the BB board.
The EXT SYNC input is at the same time routed from the QC board, is fed to the one input of the video switch IC202, while the other input of this video switch IC202 is receiving the G/Y signal from Q102. Selection of either SYNC INT/EXT is performed by this video switch IC202. The selected output sync signal is buffered by Q203, and is input to the BF board (SYNC PROCESS).
The HD and VD signals from QC board are clamped by D201/D203, buffered by Q201/Q202 and are input to the BF board.

Power Supply Circuit for QA, QB, and QC Boards

The power supply circuit for QA board is composed by IC305/Q301/Q302. The power supply circuit for QB board is composed by IC306/Q303/Q304. The power supply circuit for QC board is composed by IC307/Q306/Q307. The original power suppy the these respective power supplies, is the ±9V tracking power supply whose output can be turned OFF by grounding the IC's ⑧ pin. Therefore the B-channel power can be turned off while the A-channel is selected. The A-channel power can also be turned off while the B-channel is selected in the same manner. When the internal TEST signal is selected. all the power supplies to QA, QB, and QC boards are turned off.

YPBPR SIGNAL PROCESS, AND GBR APERTURE CONTROL CIRCUIT (BB BOARD)

GBR/YPBPR selection, YPBPR to GBR conversion, and aperture control.

Major circuit blocks are the YPBPR signal process circuit and the GBR aperture control circuit.

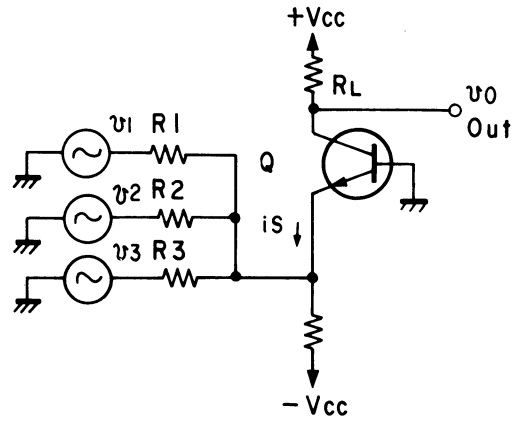
IC6, IC7, IC8 (LA7016) are the GBR/YPBPR select switch. When YPBPR input is selected, input signals are routed through the YPBPR signal process circuits and are then input to the GBR aperture control circuit. When the GBR input is selected, input signals are directly applied to the GBR aperture control circuit. When YPBPR input is selected, the YPBPR signals are fed to the analog switches of IC1, IC3 that is the switch in order to separate the PR and the PB signals in the B&W mode. The Y signal is input to the analog switch of IC2 that is the selection switch of either internal TEST signal or the Y signal. Therefore, the TEST signal is input to the Y signal circuit in the YPBPR signal process circuit in place of the Y signal. These YPBPR signals are passed through respective analog switches and then fed to the YCWCN to GBR conversion matrix circuit. Its output GBR signals are fed to the selector switches of IC6, IC7, IC8 ⑦ pins where either the matrix output GBR or the direct input GBR are selected. The output signals are routed to the GBR aperture control circuits and to the COLOR/B&W select switches, and then fed to the output.

YPBPR to GBR Conversion Matrix Circuit

This conversion is performed in order to realize the following equations.

$$\begin{pmatrix} G \\ B \\ R \end{pmatrix} = \begin{pmatrix} 1 & -0.226 & -0.477 \\ 1 & 1.826 & 0 \\ 1 & 0 & 1.576 \end{pmatrix} \begin{pmatrix} Y \\ P_B \\ P_R \end{pmatrix} \quad \cdots ①$$

This conversion requires the addition of the video signals. The video signal adding is performed by the following circuit.



Now the video signals v1, v2, v3 are respectively multiplied by the coefficients K1, K2, K3, and are added together. That is:

$$v_O = K1v1 + K2v2 + K3v3 \cdots ②$$

The equation mentioned above can be obtained.

Assuming that the emitter resistence "Re" of the transistor "Q" whose base has been grounded in the Fig. is exceedingly small as with R1, R2, and R3, the signal current "is" which flows to the emitter of "Q".

$$i_S = \frac{v1}{R1} + \frac{v2}{R2} + \frac{v3}{R3} \cdots ③$$

If hfe of the transistor Q is high enough, approximately the "is" CURRENT FLOWS IN THE Q's collector. So, output from the collector is the voltage "vo":

$$v_O = R_L i_S = \frac{R_L}{R1} v1 + \frac{R_L}{R2} v2 + \frac{R_L}{R3} v3 \cdots\cdots ④$$

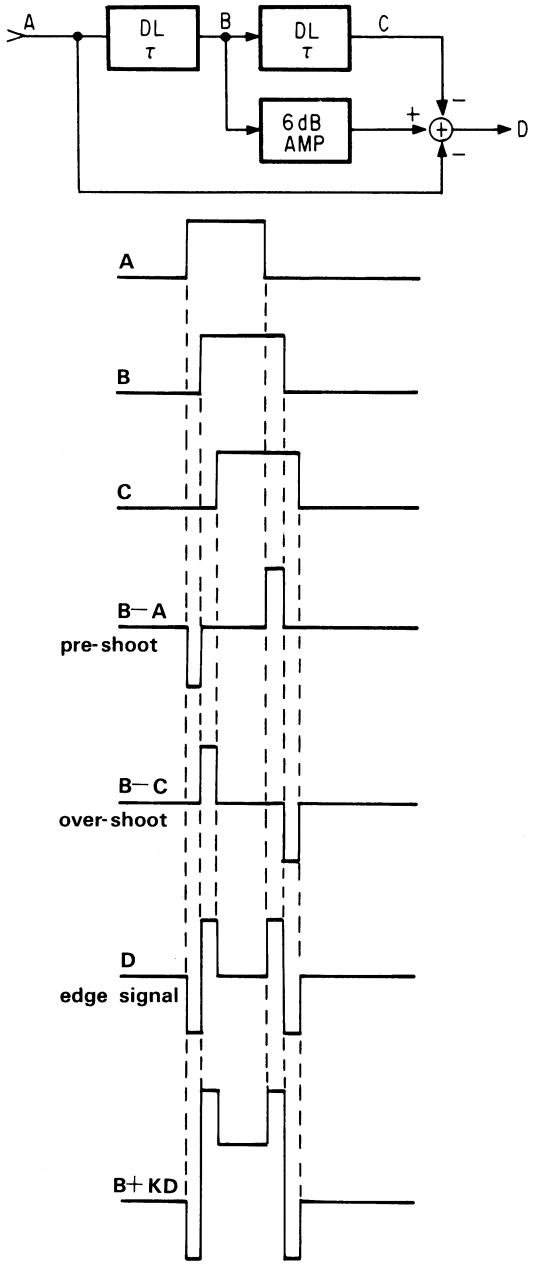
Therefore the above described coefficients are:

$$K1 = \frac{R_L}{R1}, \quad K2 = \frac{R_L}{R2}, \quad K3 = \frac{R_L}{R3} \quad \cdots\cdots ⑤$$

Followings are the description using the actual circuit. The PB signal is buffered by Q1, Q2, the Y signal is buffered by Q9, Q10 and the CN signal is buffered by Q17/Q18 respectively and are routed to the matrix circuits. Since the PB signal and the PR signals are having negative coefficient as shown in equation 1, polarity inversion is needed. The polarity inversion is performed by IC4 and IC5 (BX1190). The matrix is performed by Q3, Q11, Q19. The matrix output GBR signals at respective collectors are routed to the emitter followers of Q4, Q12, Q20, then to the level shift of D6, D12, D15, and are finally output.

Aperture Control Circuit

This circuit is adding pre-shoot and over-shoot to edge signal of the video image. Therefore, edge signal is emphasized by this circuit. This circuit uses delay lines in order to generate the edge signal by addtion/subtraction operation among the delay line output signals. The output edge signal is then added to the original video signal. Its operating principle is shown in the following illustration. The signal A is the original video signal. The signal B is the delayed video signal where the signal A is delayed by "τ" to make the signal B. The signal C is the further delayd signal where the signal B is again delayed by "τ" to make the signal C. The pre-shoot signal is made by B−A subtraction. The over-shoot signal is made by B−C subtraction. The pre-shoot and the over-shoot are added to make the edge signal of 2B−(A+C) is obtained. Amplitude of this edge signal is adjusted and is added to the video signal B. Then the edge-corrected video signal is obtained. This is the fundamental idea of the aperture control operation.



Frequency response of this aperture correction circuit is obtained as follows. When the sinusodial wave signal (Esin2πft) is input,

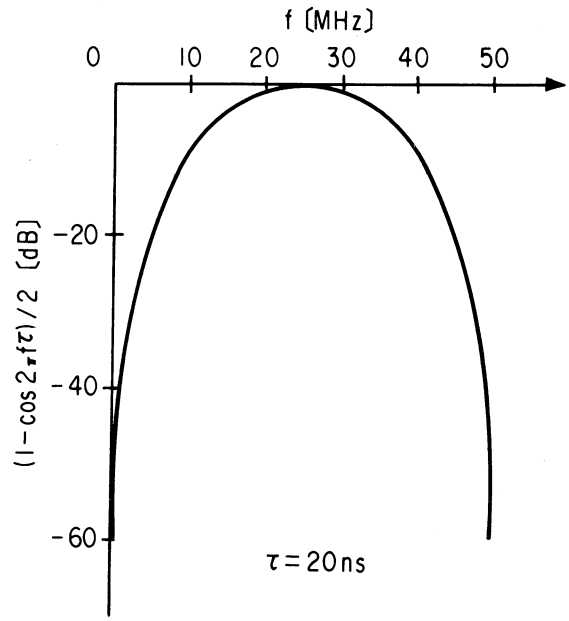
$$D=-E\sin 2\pi ft=2E\sin 2\pi f(t-\tau)-E\sin 2\pi f(t-2\tau)$$
$$=2E(1-\cos 2\pi f\tau)\sin 2\pi f(t-\tau)$$

Therefore the output is the delayed signal of the input signal by "τ", having the gain of 2E (1−cos2πfτ).
The frequency whereby the gain becomes maximum is written into the following equation,

$$\cos 2\pi f\tau=-1$$

from the above, it becomes $f=\frac{1}{2\tau}$

Since the delay line of τ=20 ns is used, it becomes a 25 MHz MAX aperture circuit.
The frequency response of D is shown in Fig. below.



The aperture control circuit in the B_B board is to generate the edge correction signal for the **G, B, R** signals. The method to generate the edge signal is as follows. Y signal is first generated from the **GBR** signals by matrixing them. The Y signal is fed to the edge signal generating circuit where the edge signal is generated for the Y signal. This edge signal is gain-controlled and is distributed to respective **G, B, R** signals.
Following is the circuit description referring actual circuit. The resistor matrix network is located in the emitter circuit of the common-base transistor Q25. As the kRGB signals are fed to this matrix network, the Y output signal is output from Q25 collector. This Y signal output is passed through emitter follower Q26, level shifter D19, and is output from emitter follower Q27. This Y signal output is again buffered by Q28, 20ns delayed by the delay line DL4. It is again buffered by Q29/Q30 and 20ns delayed by DL5.

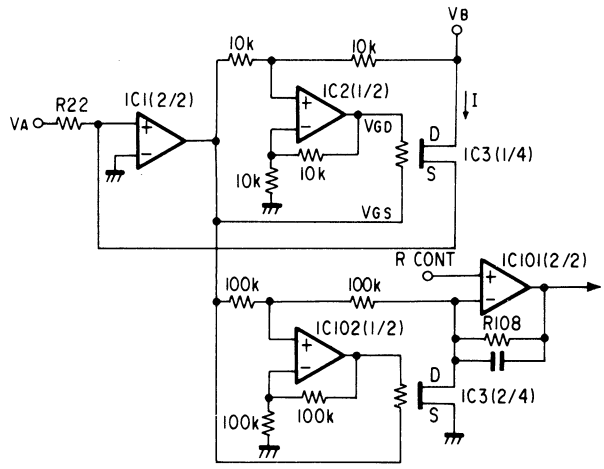
The afore-mentioned A, B, C signals are thus generated. Addition and subtraction of these three A, B, C signals are performed by Q36. The output is obtained from Q36 collector in the form of electric current. This current output is routed to differential amplifier of Q32, Q33 common emitter circuit so that the amplification gain controlled by the voltage difference between the bases of Q32 and Q33. Its output is taken from Q33 collector, amplified by Q34, buffered by emitter follower Q35. This edge signal output is added to the G, B, R signals respectively. The B&W signal for use in the B&W mode is also obtained from the emitter of Q30 in this circuit. Since edge signal generation and its gain controlling circuit provide some delay, the Y signal is delayed by the delay line DL6, and is sent to the COLOR/B&W select switch IC9, IC10, IC11 (LA7016).
The G, B, R signals are at the same time, delayed by the delay lines DL1, DL2, DL3 respectively. These delay lines have the equivalent delay time as that of DL4 + DL6 respectively. The delayed G, B, R signals are applied to the COLOR/B&W select switch where the select switch output and the afore-mentioned gain-controlled edge signal are mixed in the emitter circuits of the common base mixers Q7, Q15 and Q23. The mixed outputs are obtained from their collectors, buffered by Q8, Q16, Q24, and level-shifted by D10, D14, D17 and are output.
This is the aperture control for the RGB signals.

DYNAMIC VIDEO GAIN CONTROL (BC BOARD)

The Bc board has the dynamic video gain control circuit that is to correct the white uniformity over the entire area of the monitor screen by controlling the G, B, R respective video gain dynamically, corresponding to the video signal content.
The R channel alone is discussed. The G, and B channels are exactly of same operation.

Control Signal Attenuator

This circuit is to have larger correction value of white uniformity correction when the BRIGHT signal is small (in case of brighter image), and to have smaller correction value of white uniformity correction when the BRIGHT signal is large (in case of darker image).
The R-CONTROL signal that is generated in the ZE board is passed through the low-pass filter of IC101(1/2), and is input to operational amplifier IC101(2/2). Gain of this operational amplifier can be controlled by changing the resistor's value between D−S (drain and source) of FET IC3(2/4).
The BRIGHT signal is buffered by Q2/Q3 and is level-shifted by IC1(1/2). This output voltage is applied to the gate-bias circuit of IC1(2/2) and IC2(1/2), that is shown as V_A in the illustration.



The IC2(1/2) and IC102(1/2) are used to obtain the optimum bias for V_{GD}.

$(V_B+V_{GS})/2=V_{GD}/2$

The resistance between D−S of IC3(1/4), that is R_G is given as follows.

$$R_G=\frac{V_B}{I}=\frac{V_B}{-\frac{V_A}{R22}}=\frac{R22\cdot V_B}{-V_A}$$

Since the IC3's four FETs have uniform characteristics, the resistance between D−S of IC3 (2/4) is also R_G, if IC3 is uniformly biased. Therefore IC101(2/2) has the amplification gain A_V, as follows.

$$A_V=\frac{R_G+R108}{R_G}=1+\frac{R108}{R_G}=1+\frac{R108}{\frac{R22\cdot V_B}{-V_A}}=1+\frac{R108}{R22}-\frac{V_A}{V_B}$$

Since V_B is of fixed value, A_V is changed linearly with the change of V_A. The R-CONTROL signal is attenuated together with the change of BRIGHT signal. This output signal becomes the Y-input signal to the multiplier IC104.

Video Gain Control

The R-VIDEO signal is back-porch clamped by IC103 and fed to one input of the analog switch IC103. This signal is also shunted to become the X-input to the multiplier IC104. Therefore the video gain signal is amplitude-modulated by the CONTROL signal at the multiplier output. This gain-controlled video signal is again clamped by IC105, and routed to the another input terminal of the analog switch IC103.

Digital Uniformity ON/$\overline{\text{OFF}}$

The analog switch IC106 usually selects the gain-controlled video signal for white uniformity correction. But if the $\overline{\text{DELAY}}$ is off (LOW), or the digital uniformity correction is off (LOW), the video signal that is not gain-controlled, is selected.

Video Off

The multiplier IC104 has the control inputs that have the differential input circuit configuration. If the Y ⊖ input of IC104 receives the higher voltage than the control signal, the control voltage becomes negative in all. Then the video amplification gain can be less than 0. This circuit operation is utilized when the PROM data are used.

CONTRAST AND GAIN (DRIVE) CONTROL CIRCUIT (BD) BOARD

Following is the discussion regarding R channel only. The Grand B channels operates in exactly same manner.

Back Porch Clamp Circuit

This circuit is composed of Q101 through Q105 which is amplifier with the dc level-shift function. Gain is obtained as the following equation.

$$\frac{R107}{R103//R104} \cdot \frac{R111}{R109}$$

Gain is approximately 1.4 times.

The DC level shift can be done by adding any DC signal to Q104 base.

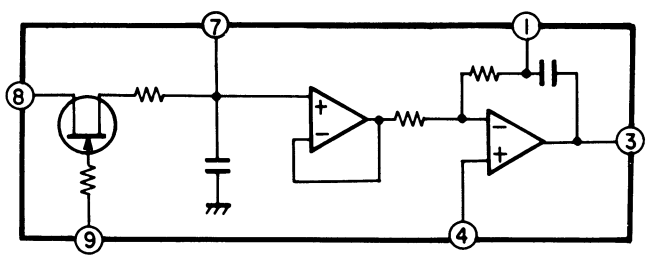
IC101 is a comparator as shown in the following illustration, which is the SONY BX-1313 type comparator equipped with a sample-and-hold circuit. Input signal is feed to pin-⑧ which is sampled as long as the sampling pulse at pin-⑨ is HIGH. The sampled voltage is held at pin-⑦ until next sampling pulse is input.

The sampled voltage at pin-⑦ is compared with the reference voltage input Vref signal at pin-④. If the V is higher than Vref, the LOW level is output. If the V is lower than Vref, HIGH level is output.

This IC101 functions as a clamp circuit too. If a back porch clamp pulse is input to the pin-⑨, and if pin-③ is connected to Q104 base, then the Q105 emitter output's back porch is clamped to the Vref level. the Vref signal and the back porch clamp pulse are sent from the BG board. During the Delay mode operation, the Vref is increased and the pedestal level is also increased.

The capacitor C107 is determining the calmp time constant.

approximate circuit diagram of IC101 (BX-1313)



VIDEO/REFERENCE PULSE Select Switch

IC102 (LA7016) is the analog switch that receives the clamped video signal input to pin-② while the clamped reference pulse is input to pin-⑦. The reference pulse is the mixtured pulse of the bright pulse and the contrast pulse at the BG board. Its pin-③ is receiving the selection control signal for this analog switch. By this pin-③ signal, the switch is set to the pin-⑦ as long as the reference pulse is present. Therefore, the video signal with the reference pulse inserted, is output from the IC102 pin-④.

RGB ON/OFF Circuit

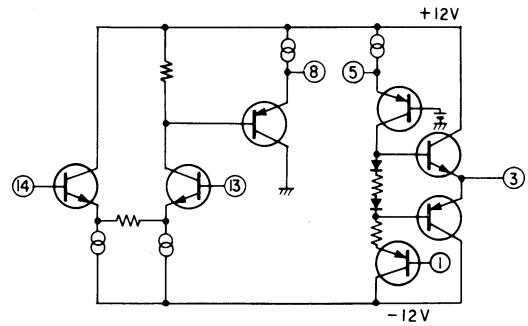
When the control unit's RGB ON/OFF switch selects the OFF position, cathode receives no signal ad the G1 potential is also decreased. The G1 potential is controlled by CA board. This OFF signal of the RGB ON/OFF switch removes the video signalat the BD board as this signal is input to Q108 base. For example, If this switch is set to the R OFF position, Q108 is turned ON that put IC102-③ pin LOW to connect the IC102 input to the ⑦-pin so that the video signal at ②-pin is not output.

CONTRAST/GAIN Control Circuit and Pedestal Clamp Circuit

IC103, IC104, IC106, IC107 are constituing the CONTRAST/IN control circuit and the pedestal clamp circuit.

The IC103 is a differential amplifier having the capability of DC level shift. If a variable resistor is connected between pin-⑤ and pin-⑧, the gain control becomes possible. If the pin-①'s DC level is changed, the level shift becomes possible.

IC103 (BX-1315) equivalent circuit



IC104 is used as a variable resistor connected in between pin-⑤ and pin-⑧. IC104 is a voltage-controlled variable resistor where V4, V6 are the control voltages. The resistance value (taken as R13) between pin-① and pin-③ can be changed by varying the voltages of V1-V6 and V3-V4. (V1-V6 is the potential of pin ① - pin ⑥.) V4 is controlled by the CONTRAST control and the GAIN control.

C119 is used to modulate the V6 with V1 until V1−V6= V3−V4=dc.

If C119 does not exist, V1-V6=ac is established so that R13 is modulated by V1, that results in waveform distortion.

Q106 is installed so that IC104-⑥ pin can follow the -④ pin change when the -④ pin voltage is changed.
Q106 is turned on during the blanking period.
IC106 samples the CONTRAST pulse and is controlling the resistance value of IC104. It receives the Contrast pulse's sampling pulse at pin-⑨ that has the same timing as the CONTRAST pulse. It receives the video signal with the CONTRAST pulse inserted, at pin-⑧ so that it samples and holds the CONTRAST pulse's "level V". The sampled "level V" is compared with the reference voltage "Vref" that is input at pin-④. If the level V is higher than Vref, the LOW level is output. If the level V is lower than Vref, the HIGH level is output from pin-③. This output is routed to Q107 base, inverted by Q107 collector, and is input to IC104-④ pin. Therefore, If level V is higher than Vref, the IC104-④ pin becomes HIGH level that increases the IC104 resistance value that decreases IC103 gain to make the level V lower until level V = Vref is established. Thus, the CONTRAST pulse has feed-back loop so that it maintains the constant amplitude even though IC103, IC104, IC105 have drift.
IC106 is the pedestal clamp IC. Its operation is same as that of afore-mentioned IC101 clamp circuit.

Buffer Amplifier

IC105 is the video amplifier having approximately 30 times open-loop gain. It outputs signal to the CA board with 75 ohms.

INTERNAL SIGNAL GENERATORS (BE BOARD)

Clock Oscillator : X1, IC1(4A), IC2(4B)

Approximate 48 MHZ is oscillated by IC1(4A), IC2(4B). It is divided by 4 with IC2(4B) to obtain apprximate 12 MHz that is the system clock.

Horizontal rate signal generator : IC3(2C), IC4(3C), IC5(4C), IC6(3D), IC7(3E)

IC3, IC4, IC5 are the hexadecimal dividers that generates the 9 bit digital data (from 0 to 362 count at 1H) that is supplied to IC6 as the address data. The timing data of eight signals such as $2f_H$, H.SYNC, B1, H.HATCH, G1, G2, LATCH CLK, and CLEAR are memorized and located in IC6. The memory page is switched by the system A and B signals input to pins-㉕ and -㉖ of BE-1, selecting one among four timings.

Vertical Rate Signal Generator : IC8(1F), IC9(2F), IC10(2E), IC11(1E), IC12(1J), IC13(2J)

The $2f_H$ signal is used as the clock pulse that is divided by 1125 times. As the timing is determined by the clock input, the vertical rate signals such as V.SYNC, B2, V.SYNC', V.HATCH, G3, G4, G5, and CLEAR are output. G3, G4, G5 are latched by the H. SYNC signal.

H. and V. Pattern Signal Generator : IC15(1E), IC16(1D), IC17(1C), Q7

The signals such as B1, G1, G2, B2, G3, G4, G5, CONT-A/CONT-B are input and are used to determine the output video signal amplitude and generat the video signals such as "SET UP", "FLAT FIELD" and "GRY SCALE". The video signal amplitude (D/A convertor) is determined by the constance current source Q7, resistor array and open collector array.

HATCH Signal Generator : IC21(2D), IC23-¼ (3J-¼), Q6

The H.HATCH signal is determined to have approximate 35ns pulse width by R15, C15 that is mixed with the V. HATCH signal. The mixed signals are sent to Q6 base. If the HATCH signal is selected to be output, the FLAT FIELD is also automatically selected so that these two signals are mixed by Q6 to generate the HATCH signal.

SYNC Signal Generator

Receiving the afore-mentioned H.SYNC, V.SYNC, and V.SYNC" timing signals, the specified output signals of H.SYNC, V.SYNC, and COMPOSITE SYNC are generated.
The H.SYNC and V.SYNC signals are output by the invertor/ open collector to be pulled up the⊕power supply. The COMP SYNC is output through buffers Q8 and Q9.

Video Buffer : Q4, Q5

The afore-mentioned H.V pattern signal and the hatch signals are output through Q4, Q5 with 75 ohms.

Invertor, Dot Signal Generator and Brightness Control: IC23(3J), IC24(4H), IC25(4G), IC26(4F)

As receiving the external command input, brightness control of the output video signal, invertion of the hatch signal, generation of the dot signal are performed.
When the external command input is OPEN, all operations are set to NORMAL.

Generation of the PLUGE Signal (IC27, Q14 and Q15)

The PLUGE signal is superposed to the video signal generated by IC17 and output. When the PLUGE signal is set, the black signal data is output from IC17. When the PLUGE signal is not set, its output is inhibited by the signal from ④-pin of BE-14.

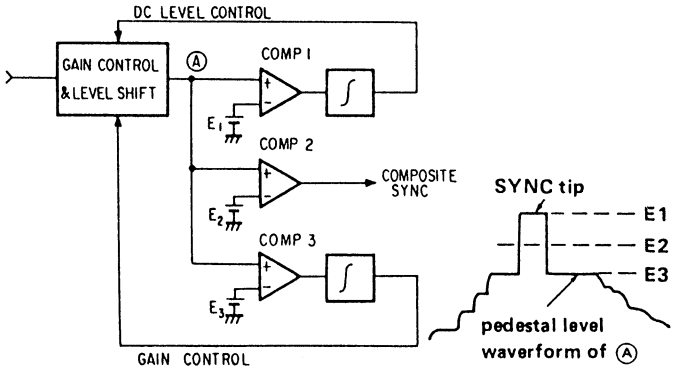
INPUT/TEST Control : Q1 through Q3

When external command input is input that enables external video input is allowed or TEST signal is allowed, the +5V power line is turned off. It is because that the external input video signal and the internally generated signal from the BE board will not make interference each other.

SYNC PROCESS CIRCUIT (BF BOARD)

Sync Separator Circuit having Sync AGC Function

In order to establish the AGC circuit using input sync signal as the reference signal, an amplifier that can detect and control the amplification gain and dc level is necessary.
Fundamental circuit is shown in the following illustration.
The sync signal is amplified by the GAIN CONTROL & LEVEL SHIFT amplifier that provides the inverted output to each of the comparators of COMP-1, -2, -3. The comparator COMP-1 provides output so that the sync tip's dc level becomes E1 as shown in the illustration. The other comparator COMP-3 provides the GAIN CONTROL signal so that the output pedestal portion has the E3 level. These control signals are fed back to the GAIN CONTROL & LEVEL SHIFT amplifier so that the comparator COMP-2 provides the composite sync signal having the specified sync amplitude and dc level.



The GAIN CONTROL & LEVEL SHIFT circuit is consisted by the IC102, Q108, Q109 and Q110. The gain control is done by IC102 MC1496 double balanced type differential amplifier. Its output is the current output that is input to Q108 common base amplifier's emitter.
It is fed then to Q109 common emitter amplifier where output is taken from its collector and sent to Q108 emitter through R141 for negative feed back.
Its output is buffered by Q110 emitter follower.
The DC level control is performed by changing the DC current flowing into Q108 emitter.
In this SYNC AGC circuit, the SYNC tip is fixed by the DC level control while the pedestal level is determined by the gain control. The output signal from Q110 emitter is input to Q111 comparator where signal is integrated with shorter time constant in order to react to the SYNC tip. The signal is feed back by Q112 and Q113 emitter follower in order to clamp the sync tip potential to the Q111 base potential. This integrator has the shorter time constant for sync period while it is designed to have longer time constant for video period by D102, R158 in order to hold the sampled value during the video period.
The output signal from Q110 emitter is sent to Q115 comparator that is the integrator to react only to the pedestal portion, not to the SYNC portion, by having the long time constant. The signal is then feed back by Q117 emitter follower in order to clamp the pedestal level to the Q115 base potential by determining the gain control factor.
The SYNC top level and the pedestal level is thus fixed so that the SYNC signal amplitude is always constant. This signal is sent to Q115 comparator where sync signal alone is separated that is amplified by Q114, and output through complementary buffers of Q119 and Q120. The negative polarity sync is thus output.

Equalizing Pulse Extractor Circuit

IC104 (2/2) is an equalizing-pulse sampling circuit. A pulse with a amplitude approx. 3/4H is generated by the IC104 built-in monostable multivibrator, then its inverted output (IC104-⑨ pin) is fed back into the input IC104-⑪ pin, sampling the input equalizing pulse by masking it.

Back Porch Clamp Pulse Generator Circuit

IC103, IC203, IC204, IC205, Q201, Q202 and Q203 compose a back-porch clamp pulse generator circuit. During HD input, the monostable multivibrators inside IC103 and IC203 delay the phase, and a negative polarity back-porch clamp pulse is output from IC203-⑨ pin. During INT SYNC or EXT SYNC input, a similar pulse is output from IC204-⑨ pin. The clamp pulse is selected at IC205, and it undergoes polarity inversion and waveform shaping at Q201. The resulting positive polarity back-porch clamp pulse is then output from the complementary buffer composed of Q202 and Q203.
The control signal for the selector IC205 is sent from the sync signal detector circuit composed of IC205, IC206 and IC204. Even when the HD signal is being input, the clamp pulse is generated from the sync signal if it is output from the sync separator circuit.

V Sync Selector Circuit

Q304, Q305, Q306, IC201 (2/4) and IC301 compose a V sync switching circuit. IC301 switches between the HD, composite sync and test V sync signals.

H. SYNC Selector Circuit

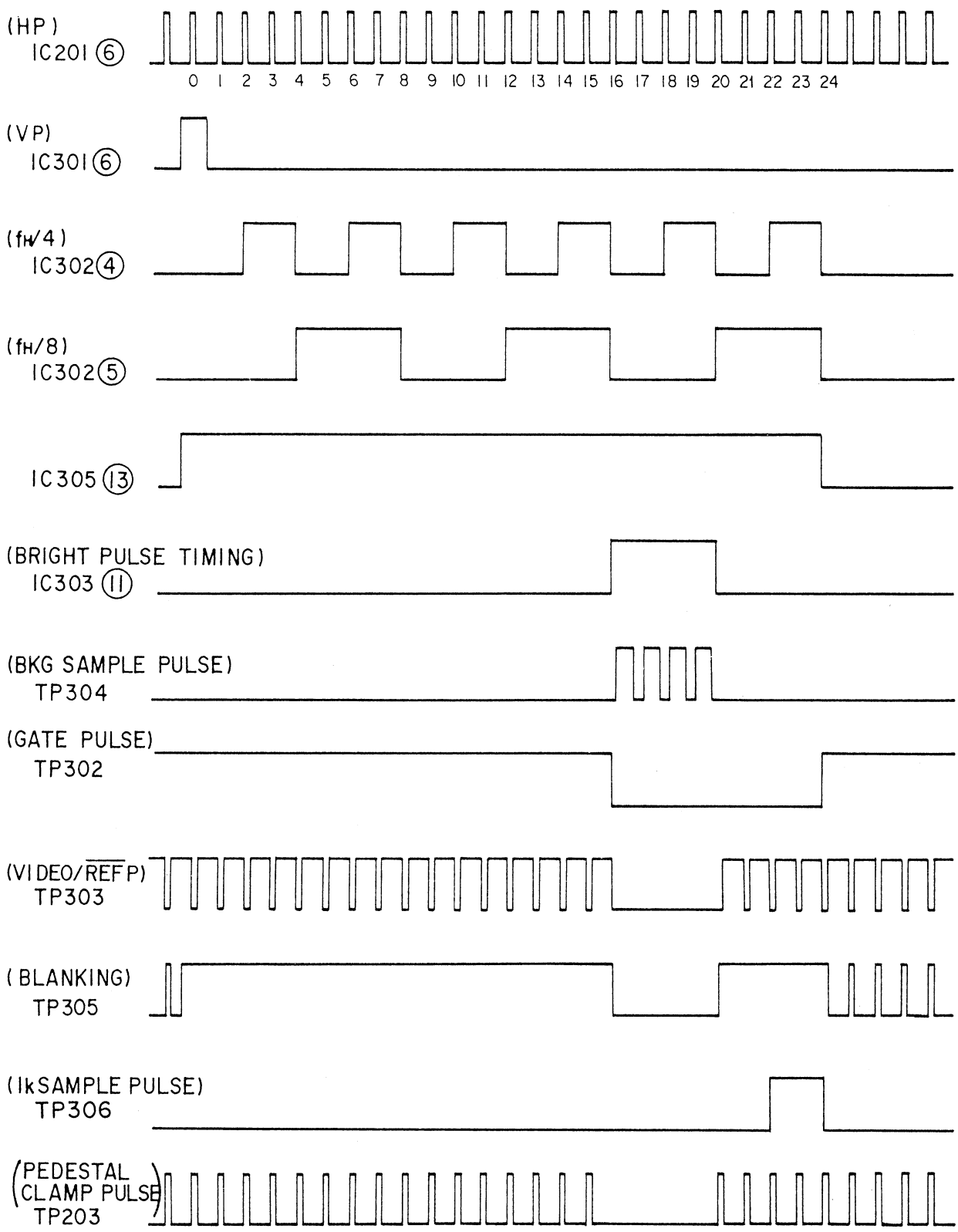
IC105 is a H sync switching circuit. It outputs the HD signal when it is input, and the composite sync signal when it is not.

PULSE GENERATOR (BG BOARD)

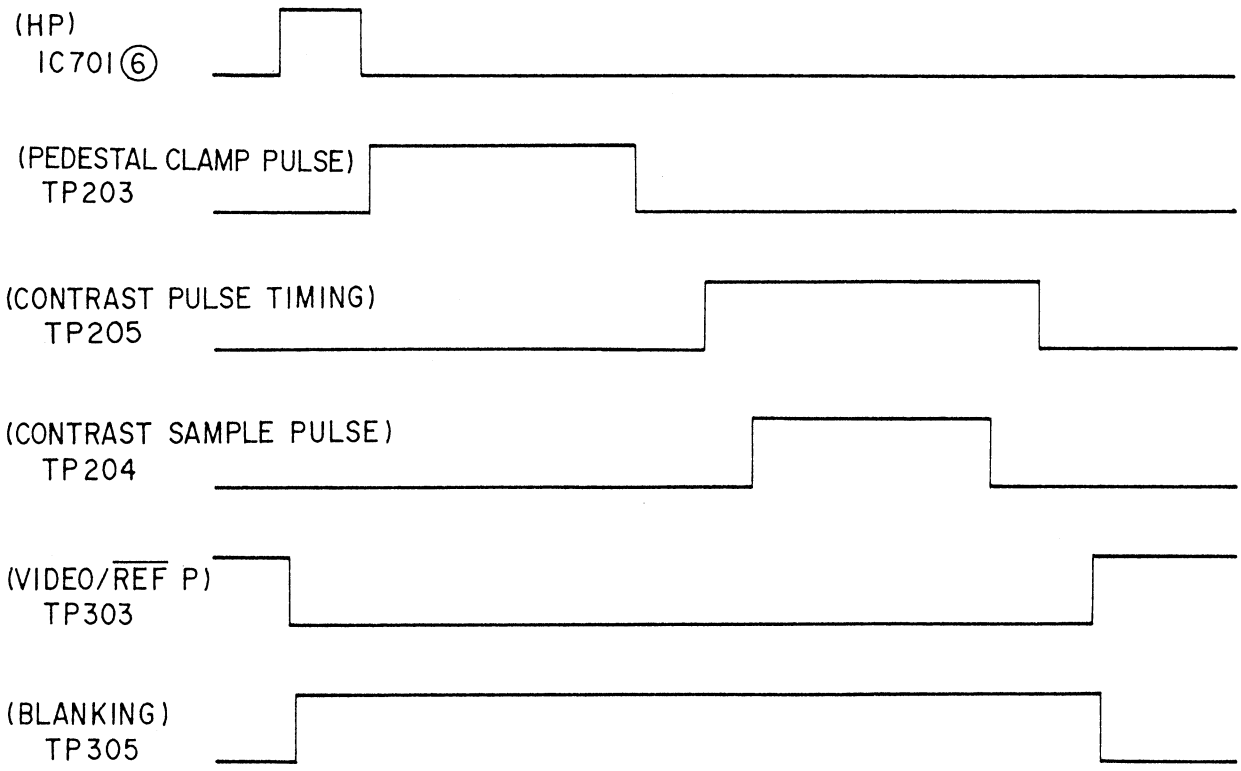
Pulse Generator Circuit to generate BRIGHT Pulse

Timing Generator Circuit for Brightness Pulse and Related Pulses
The brightness pulse, BKG sample pulse, gate pulse and video/REFP pulse used by the previously explained (3-14) bias and brightness control circuit are generated at this circuit.
The timing of these pulses is as shown on fallowing the timing chart.
The H and V pulses generated at the deflection circuit (D board) are input to the CLK and CLR terminals of the counter composed of IC304 and IC305 to produce these pulses.

BG BOARD TIMING CHART 1/2 (V BLANKING PERIOD)



BG BOARD TIMING CHART 2/2 (H BLANKING PERIOD)



Timing Generator Circuit for Contrast Pulse and Related Pulses

The contrast pulse and contrast sample pulse used by the previously explained (3-12) gain and contrast control circuit are generated at this circuit.
The timing of these pulses is as shown on the following timing chart, They are generated from the H pulse generated at the deflection circuit (D board).

Reference Pulse Generator Circuit

The reference pulse is a combination of the brightness and contrast pulses. This pulse is superposed to the video signal at the BD board, then it is used at the bias and gain control circuit and the gain and contrast control circuit.
The brightness pulse amplitude can be changed with the brightness control on the front panel, and the contrast pulse amplitude with the contrast control.
Brightness and contrast control voltages are finally sent to the buffer inside IC102, and sampled by the above-mentioned brightness timing and contrast timing pulses at IC105 to become the brightness and contrast pulses.
These pulses are added by the adder composed of Q110 to Q113.
The resulting pulse is clamped at the clamp circuit including Q115 to Q117 and IC103, then output as the reference pulse.

Delay Control Circuit

In the delay mode, this circuit increases contrast pulse amplitude and decreases brightness pulse amplitude. This results in less contrast and more brightness.
Clamp voltage of the BD board is also changed.

ABL Circuit

Q101 to Q104 compose a contrast ABL circuit.
It increases contrast pulse amplitude in case of a large ABL current.

VIDEO OUTPUT (CA board)

Since R, G, B, have the exactly equivalent circuits, the R channel alone is discussed.

Pre-amplifier

This circuit consists of differential amplifier and the same phase as input is output.
The gain of this amplifier is as follows.
R7/R4 = approx. × 2

VIDEO OUTPUT Circuit

This is a general cascode amplifier. Q2 is a bias circuit for buffers in the next stage and Q23 is DC current source for adjusting pedestal level bias of the video signal.
The gain of this amplifier as follows.
R18/R16 = approx. × 30

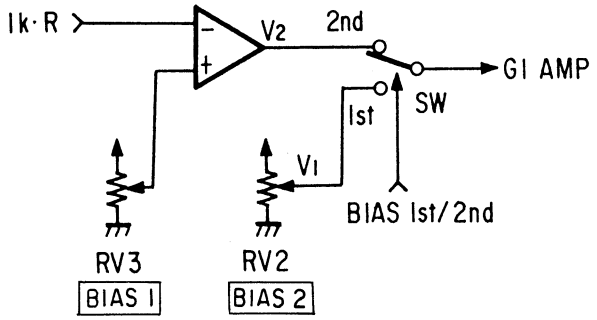
Q14, Q15 are the buffer amplifiers whose output is sent to CRT cathode via CB board.
Q10 through Q12 circuit is to cut-off Q14.
As Q13 base is set to LOW level, Q10 through Q12 are turned on to cut off Q14. Then Q15 collector current becomes the cathode current flowing from CA-9 terminal. The resistor R35 is installed in Q15 collector that detects the cathode current.
The gate pulse that turns on/off Q13 is supplied from BG board. This pulse has the same timing with the BRIGHT pulse. The resistor R35 detects the cathode current when the BRIGHT pulse is sent to cathode.

Blanking Circuit

G, B, R channels are controlling their respective G1 voltage independently.
The blanking pulse is sent from the deflection circuit and is waveshaped by Q601 though Q609 to produce the blanking pulse output having 120 Vp-p. This pulse is distributed to G, B, R respective G1 control circuits. The R channel G1 control circuit alone is discussed as follows. The G1 control signal is input to Q18 base. This voltage is amplified by Q18. Q19 cascode amplifier and output via Q20 buffer. D15, C24 are the clamp circuit that clamps the blanking pulses HIGH level (prepared by Q601, Q609) to VG1. This output is sent to CRT G1 via CB board. If the control unit (N board) R ON/OFF switch is turned OFF. Q18 base input becomes GND level potential. As Q18 base is set to GND level. Q19 is cut off to put G1 approx. −120V that cuts off beam.

Black Balance Stabilizing Circuit

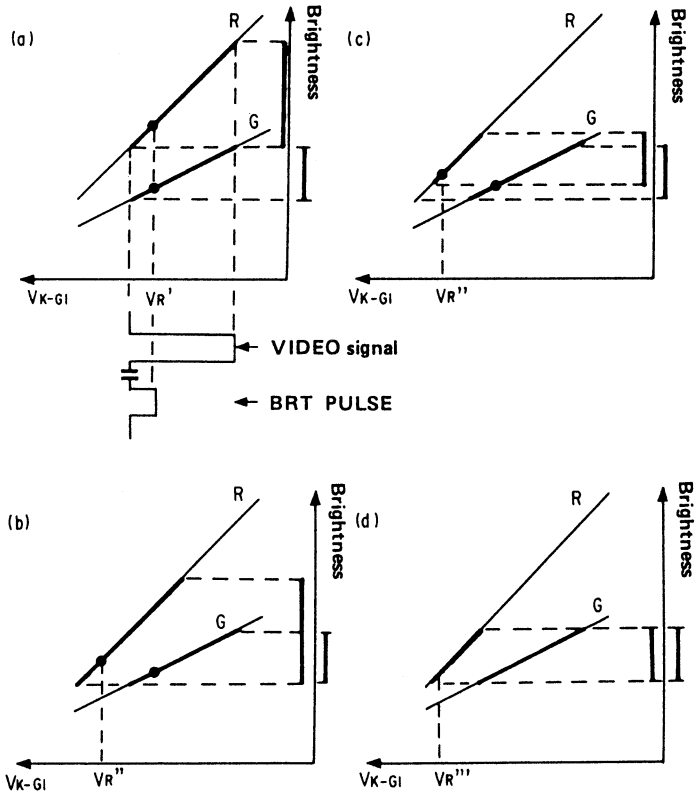
IC2 and IC3 are the black balance stabilizing circuit that control the G1 voltage by detecting a cathode current for black balance constant. These circuit are already discussed in the Bias and Bright Control Circuit. Following is the description for the necessity of RV2.



The RV2 is a potentiometer for facilitate adjustment of BIAS 2 and gain. When performing the adjustment using RV3 alone, the gain and the bias should be adjust alternately as follows.

Assuming that the conditions may have the same amplitude and the same $V_{K\text{-}G1}$ among RGB channels, as shown in fig. (a). B channel is omitted in fig. (a). As fig. (a)is showing the R channel has higher gain and bias so that it is attempted to adjust the color temperature until fig. (d)condition is obtained. First, the R bias adjustment is made by RV3 as shown in fig. (b), and perform the R-gain adjustment as shown in fig. (c). Since the black balance stabilizing circuit is operating to maintain the bright pulse amplitude as constant value, the bright pulse's $V_{K\text{-}G1}(=V_R'')$is not affected even if the amplitude is decreasing by turning the R-gain adjustment, so that the amplitude of the black level and the white level is affected centering around V_R''. Therefore, when the black balance stabilizing circuit is operated, it is necessary to perform the off-set adjustment (bias adjustment) in fig. (b) and the amplitude adjustment (gain adjustment) in fig. (c) alternately in order to obatain the color-temperature adjusted condition as shown in fig. (d).

This adjustment can be completed by one time adjustment. not by repeating two adjustments alternatingly, if the black balance stabilizing circuit is temporarily disabled during adjustment. If the switch SW as shown in the following illustration is set to the 1st position, the $V_{K\text{-}G1}$ can be determined by RV2 alone. Therefore, the adjustment is made as follows. The switch SW is first set in the 1st position, and adjust RV2 as shown in fig.(b) for bias adjustment. Adjust gain adjustment too as shown in fig.(d). Set then the switch SW in the 2nd position in order to operate the black balance stabilizing circuit, and adjust RV3 until V2= V1 is established for color temperature adjustment. The alternate tracking adjustment is no more necessary.



GENERAL DESCRIPTION (N, ZA, ZC, ZD BOARDS)

Function

This block has the following functions.

(1) Aperture control (aperture control adjustment, ON/OFF sitch)
(2) RGB ON/OFF
(3) Internal SG/INPUT selection, internal SG output video pattern selection.
(4) Color temperature adjustment
(5) Digital convergence adjustment

Flow of Control

If the key switches on the N board is operated, the one-chip micro processor on the N board reads the information, codes the neccessary commands, and transmit the data by RS422 in serial form. The RS422 serial data transmission is done by every 3 bytes in asynchronous system. This serial data is received by SIO on the Z_C board, decoded by the CPU, and the decoded data are distribued to each port according to the command. The controls according to the key operation on the N board, is carried out.

The ports and memories that are controlled by the Z_C board, are assigned as follows.

Z_C RGB ON/OFF, NORMAL/TEST, SET UP etc.
Z_A cursor ON/OFF, cursor position, internal SG pattern selection and other controls for the BE board, aperture, W-BAL control.
Z_D digital convergence

Data Memory

The Z_C (EEPROM) memorizes the color temperature and digital convergence data. The digital convergence data is up to rough No.13.

The Z_D (S-RAM + BATTERY) memorizes the digital convergence data of rough No.14 and later so that the data is not lost even after Power OFF. The data is output to each ports when the Power is turned ON nest time.

The data runs in the S-RAM on the Z_C board during the adjustment, and is transmitted and memorized by the non-evaporating memory when the NORM/INPUT key is operated. Therefore, if power is turned OFF during adjustment, the set-up data that is established during the adjustment, will be lost. Please take care.

Memory Area

There are 8 memory areas for storing the convergence data and white balance data as follows.

Memory Area	Convergence Data
1	NORMAL SCAN HDTV-A
2	NORMAL SCAN HDTV-B
3	NORMAL SCAN PROG
4	Escape Area
5	UNDER SCAN HDTV-A
6	UNDER SCAN HDTV-B
7	UNDER SCAN PROG
8	Escape Area

Memory Area	White Balance Data
1	PRESET HDTV-A
2	PRESET HDTV-B
3	PRESET PROG
4	Escape Area
5	MANUAL HDTV-A
6	MANUAL HDTV-B
7	MANUAL PROG
8	Escape Area

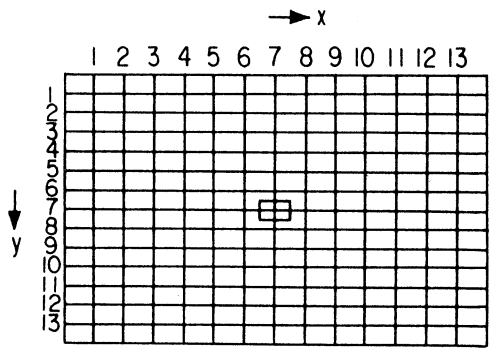
Therefore, the convergence and white balance adjustments should be performed every each memory area. However, for the memory areas No.1 to 3 for the white balance the same data are stored by the adjustment of white balance preset data.

It is impossible to change the data the data of the memory areas No.1 to 3 for the white balance separately.

Data Refresh

The data in each port can be lost due to discharge or due to external noise. The software is provided so that the data in the memories are re-written to each port during the vertical blanking period.

Digital Convergence



Hatch pattern

When the digital convergence mode is selected, the hatch pattern as shown in the illustration will come out. The most external surrounding lines are showing the effective picture area and the approx. 7% overscan area exists inside this effective picture area. However, this area reaches approx. 11% when only the horizontal direction is considered. This effective area has the crossing points of $13 \times 13 = 169$ points.

The memory of two addresses are assigned to each of 169 crossing points so that one address is used to memorize the vertical direction data while the other address memorizes the horizontal direction data. This memory is backed-up by the back-up battery located in te Z_D board. The memory data indicating the cursor position is supplied from the N board in the FINE mode and the data is increased and decreased. In the ROUGH mode, the cursor postion from no.1 through No.13 data is memorized in the separate EEPROM in the Z_C board and the control is done from the D_C board.

The cursor positions from No.14 through No.25 provide multiple address data corresponding to the afore-mentioned Z_D board memory that is increased and decreased with each address are weighted.

The general equation for this calculation is shown as follows.

$D_{N1} = D_N \pm_k f(x, y)$ equation-1

$f(x, y)$: increase/decrease pattern corresponding to cursor position

D_{N1}: new data

N: old data

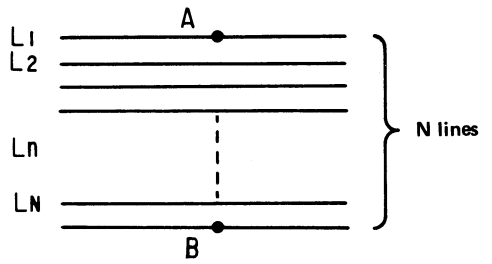
k: coefficient

In practice, the k in the above equation is increased/decreased to obtain each D_{N-1}. This calculation is done by the 16 bits. The result is obtained from the upper 8 bits so that the error is minimized.

The data D_N is memorized in the Z_D board RAM, but data k is memorized in the Z_C board EEPROM. Therefore, once adjustment is completed, the Z_C board and the Z_D board should be handled as a pair. But if the "MEMORY ALL RESET" is established, they can be handled separately.

The memory read-out is done by accessing memory together with beam scan so the read-out data is D/A converted, passed through LPF and is output as the correction waveform. There is area where data does not exist. The area between the hatch crossings in the vertical direction has no data. So, the linear interpolation from the data from the upper line and the lower line is utilized. For example, the A point and B point in the following Figure have the correction data. The area between A and B has the scanning lines as much as N-1 lines. Then the correction data D_N at the I_N position can be obtained from the following equation.

$$D_n = A + (B - A)\frac{n-1}{N} \quad \text{..... equation-2}$$



Method of interpolation

In practice, this calculation is performed by hardware circuit, as discussed in the Z_D board circuit description.

This is the method to make access to the data that are obtained as the beam scanning advances, and the correction waveform is provided. The previous data should be re-written during the adjustment proceeds. Therefore, the data that are obtained by the adjustment, are input during the vertical blanking period, by employing the interrupt function of CPU.

CIRCUIT DESCRIPTION REGARDING EACH CIRCUIT BOARD

N BOARD

The N board is consisted by the single chip micro-processor (IC5) that has built-in A/D convertor and a program memory (IC3).

The port is connected to the KEY matrix, LCD unit and LED serial I/O buffer. The +5V power is supplied from thee 8-pin mini DIN connector.

The software has the programs as follows.

(1) KEY data read-out and communication of the KEY command signal.
(2) Aperture control datas' A/D conversion.
(3) Mode and function control.
(4) LCD display control.

The software is reasonably made intelligent.

ZA BOARD

This board receives the commands from the Z_C board CPU and executes the following operations.

(1) B_E board control (internal SG), and cursor generator.
(2) Aperture data and white balance datas' D/A conversion.

(1) Cursor generator

The H-HATCH, and V-HATCH signal data are counted by IC7 and IC16 respectively. The output data are compared with the cursor position data on the cursor position data port (IC24), by IC8, IC9, IC17, IC18. Only when these two data are of same value, these two data are delayed for 1/2 cycle, and are AND-gated so that the output pulses are obtained as the Cursor Pulse. IC1, IC2, IC3 count the vertical sync and are oscillating the Flashing gate pulse that switches ON/OFF the above mentioned cursor pulse.

This cursor pulse is gated by the control pulses such as CURSOR ENABLE and FLASH ENABLE of the SG CONTROL port (IC26).

The cursor pulse is finally sent as the INVERT signal during the flashig mode and is sent as the hatch's brightness control signal during the flashing mode, to the B_E board.

(2) Aperture and white balance datas' D/A conversion

The IC29 through IC34 are the compact ICs that have the two channel D/A convertors with latch function, and operational amplifiers. These ICs receive various data from Z_C board CPU and convert them to the dc voltages ranging from 0V through 10V. They provide output to the following ten channels.

Bias (1st)	R.G.B	total 3 channels
Bias (2nd)	R.G.B	total 6 channels
Gain	R.G.B	total 3 channels
Aperture		1 channel

See the section on the C_A board for details on bias and gain.

ZC BOARD

This the familier CPU board using Z80A family (IC3, IC14, IC15).

Memories are used as follows.

RAM	2K byte S-RAM
PROGRAM ROM	8K byte EP-ROM
DATA ROM	4K byte EEPROM

The serial interface SIO is IC14 that is connected to the RS422 driver/receiver (IC12, IC13).

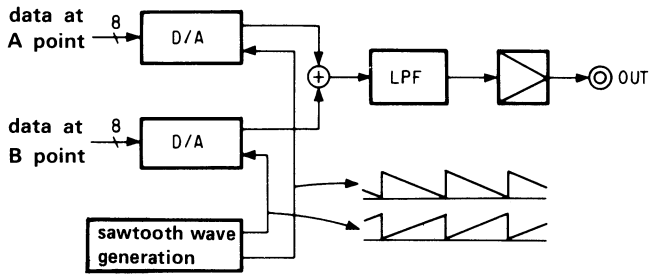
Approximate 5 MHz clock signal is generated by the S-type TTL, that is divided by two so that 2.5 MHz clock is used.
The ports (IC23, IC24, IC25) of this board provides the following funtions.

- SET-UP (V. SIZE control)
- INPUT/TEST control
- R.G.B. ON/OFF control
- Memory select control

Software of this CPU system receives command from N board and performs operation according to the commands. This is the main operation of this softward. Other operations are respective ports initialization in the event of power on, reflesh operation during the vertical blanking period and re-writing Z_D board RAMs, etc. The switch S2 is the NMI (non-maskable interrupt) switch that initializes all the memory data by software means. Therefore, take care of S2 operation. This initialization takes approx.40 seconds and then the red LED (D4) is lit on, after that, LEDs (D5, D6) are lit on, showing that all initilizations are completed.
The (ZC-2) setting pin can be connected either to A side or A side.
The Q2, Q3 circuit is to discharge the capacitor C5 in the event of power OFF so that the re-set circuit will operate correctly when the power is turned ON next time.
The IC7, IC8, IC9 circuit is the bus buffer that receives/transmits the various data between Z_A, Z_D, D_A, D_B, D_C ports and memories through the Z_M board mother board.

ZD BOARD

The Z_D board has 8K byte S-RAM (IC13) to memorizes the digital convergence data. It receives power from normal 5V and back-up battery 3V. These 5V and 3V are OR gated by a diode.
The address lines and the data lines are connected to the D/A circuit during the read-out mode and to the CPU circuit during the write-down mode (write-down is executed during the vertical blanking), which is done by IC3, IC14, IC15, IC16.
A certain point on the TV screen has the horizontal direction data and the vertical direction data. These horizontal and vertical direction data are read-out by the time division method, latched (IC20, IC22) to coincide timing, and then sent out to D/A (IC21, IC22) circuit.
The horizontal direcion address data is obtained by counting the 8 bit data by IC10, IC11. This 8 bit data is produced by dividing the one horizontal data by 256 where the horizontal data is supplied from the dB board PLL circuit. At the same time, the vertical direction data is obtained by counting the horizontal rate pulse with the sequential counters IC1, IC2, IC6.
The interpolation is then discussed, referring the following illustration.



Interpolation

The sawtooth wave whose one cycle is equal to the length of one vertical hatch pitch is provided as shown in the above illustration, in two polarities of positive polarity and negative polarity. These sawtooth waves of two polarities are produced by IC3, IC4, IC5, and are supplied to the reference voltage input terminal of the D/A convertor circuit. These two 8 bit D/A convesions are amplitude modulated by the sawtooth waves, and the outputs are added so that the section 1-6 item equation-2 is fulfilled. Thus the memories are accessed and D/A converted so the appropriate correction wavfores are always generated.

UNIFORMITY CONTROL SIGNAL GENERATOR (ZE BOARD)

Function

This circuit board generates the uniformity correction control signal for the respective **G, B, R** channels. The tv screen is divided into 27 vertically and into 55 horizontally. (The effective tv screen is divided into 28 vertically and into 51 horizontally.) Each sections have the corresponding memory addresses respectively. The switch SW1 can select either one of 8 patterns.

Address buffer

The "n × f_H" clock signal is input to buffer IC12, and then sent to the uniformity correction data memory (IC101, IC201, IC301) ROM's lower address. The 64 f_H clock signal is used as the data time division clock.

Scanning Line Counter and ROW Counter

The 18 vertical scanning lines correspond to one memory. The horizontal drive pulse (HD) is inverted by IC1 (2/4), and is fed to IC4, IC5 as clock signal. The IC4, IC5 are the 18 scanning line counter whose output is routed to IC8 for vertical interpolation. When IC4, IC5 have completed the 18 counts of scanning line, IC1 (3/4) output reset pulse which resets the counter. This reset pulse becomes the clock for the ROW counter IC2, IC3.
These scanning line counter and the ROW counter are reset by the VD timing.
The vertical interpolation circuit consists of the data time division circuit and the D/A converter that has the weighting characteristics.

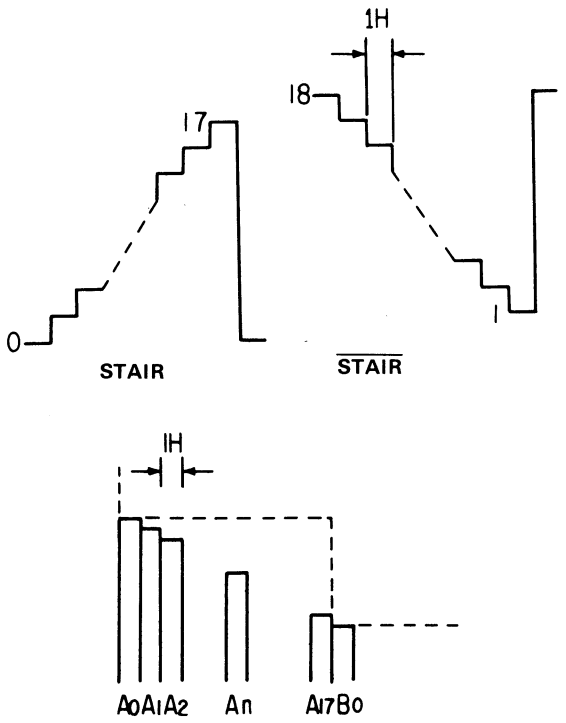
Data Time Division

The ROW counter output is inpt to the adder IC6/IC7, where 0 and 1 are fed alternatingly at 128 f_h rate. So, the ROW sends out the present address and the "present address +1" address (which is one row lower address on tv screen), alternatingly that become the upper address of the uniformity correction data memory ROM. Since the ROM output is time-divided, the present data is latched at the rise-up timing of the $64f_H$, while the next data is latched at the fall-down timing. These two data are put into in-phase, and are routed to the multiplier type D/A convertor IC105/IC205/IC305.

* D/A Convertor having Weighting Characteristics

The scanning counter output IC4, IC5 is supplied to D/A convertor IC8 that generates the STAIR signal and the inverter $\overline{\text{STAIR}}$ signal.

These two stair signals are increasing and decreasing their amplitude at the rate of 18 scanning rate.



If the vertical direction data-Ao and data Bo are taken as example.

In order to establish the linear interpolation between data Ao and data Bo, the data corresponding to each scanning lines should be as follows.

$$Ao = Ao\times\frac{18}{18} + Bo\times\frac{0}{18}$$

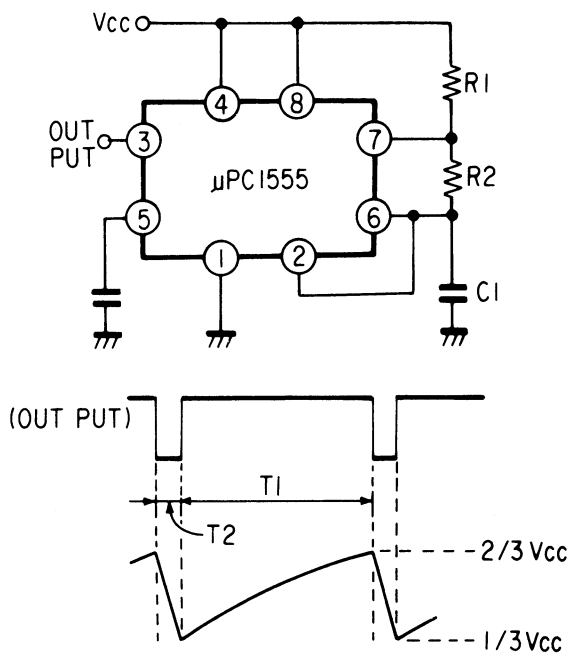
$$An = Ao\times\underbrace{\frac{18-n}{18}}_{\overline{\text{STAIR}}} + Bo\times\underbrace{\frac{n}{18}}_{\text{STAIR}}$$

$$A_{17} = Ao\times\frac{1}{18} + Bo\times\frac{17}{18}$$

The data Ao and Bo are digital value that are obtained by time division. The weighting is applied to the D/A converted output STAIR signal and to the inverted $\overline{\text{STAIR}}$ signal, that are supplied from the scnanning line counter. The weighted current output from the muliplier tye D/A convertor is added by the Io signal and the inverted $\overline{\text{Io}}$ signal respectively. Their output is converted from electric current to the voltage signal by the differentiators IC107, IC207, IC307. Their outputs are the R-CONTROL, G-CONTROL, and B-CONTROL signals in both positive and negative polarity signals.

V. PULSE Oscillator (DA BOARD)

This oscillator is a stable type oscillator using timer IC, reaet by the vertical sync signal. The stable type oscillator is shown as follows.



As the R1 + R2 charging current flows into C1, the voltage across C1 reaches the threshold level of the timer IC pin-⑥ (2/3 × Vcc), its output pin-⑦ is turned on to discharge C1 through R2. As discharging proceeds, the voltage across C1 (trigger terminal pin-②) reaches down to 1/3V×Vcc,its output is turned OFF so that the charging C1 through R1 + R2 starts. This operation is repeated to continue the astable operation. Formula of T_1 and T_2 are as follows.

$T_1 = 0.693\ (R_1+R_2)\ C_1$

$T_2 = 0.693\ R_2C_1$

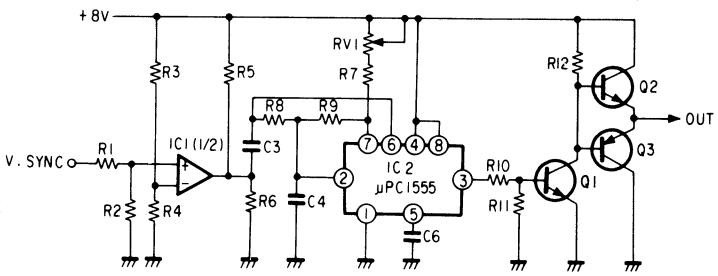
Present value of R_1 is 47 kΩ+100k-B, R_2 is 1.8 kΩ and C_1 is 0.22, therefore, T_1 and T_2 are calculated as follows.

$T_{1(MAX)} = 0.693\{(47k+100k)+1.8k\}\times0.22\times10^{-6}(S)$
$= 22.68\ ms \fallingdotseq 44\ Hz$

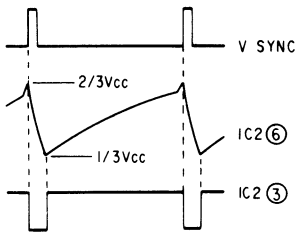
$T_{1(MIN)} = 0.693\{(47k+0)+1.8k\}\times0.22\times10^{-6}(S)$
$= 7.44\ ms \fallingdotseq 134\ Hz$

$T_2 = 0.693\times1.8k\times0.22\times10^{-6}(S) = 0.27\ ms$

The vertical pulse's retrace periodis 0.27msec so that the vertical oscillator variable width range is from 44 Hz to 134 Hz.
This oscillator is locked to the vertical sync by applying the vertical sync differentiated pulse of C1 potential, that pulls up potential to the 2/3 × Vcc level forcibly to reset this oscillator.
Actual circuit is shown as follows.

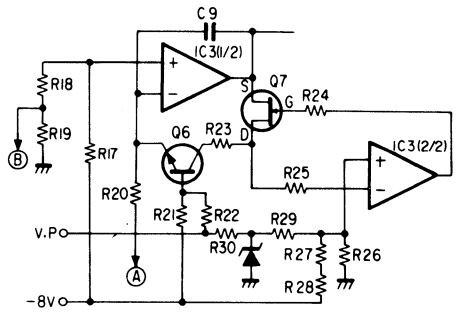


The vertical sync signal is input from the BN board with 12 Vp-p, divided by R1, R2, and is sent to comparator IC1 (1/2) where it is compared with the other input from R3, R4 potential (1/2 Vcc) so that the vertical sync input is wave-shaped. This output is defferentiated by C3, R8 and is then input to IC2- ⑥ pin. The resistor R1 in the illustration's circuit means RV1+R7 , the resistor R2 means R9 and C1 means C4. IC2- ③ pin output is inverted by Q1, buffered by Q2, Q3 to provide output.



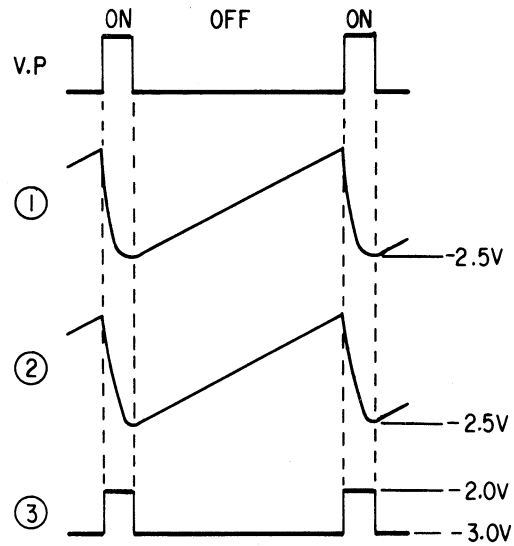
VERTICAL SAWTOOTH-WAVE GENERATOR (DA BOARD)

This vartical sawtooth generator comprises the sawtooth generator cirucit and frequency detect circuit. The sawtooth generator is shown as follows.

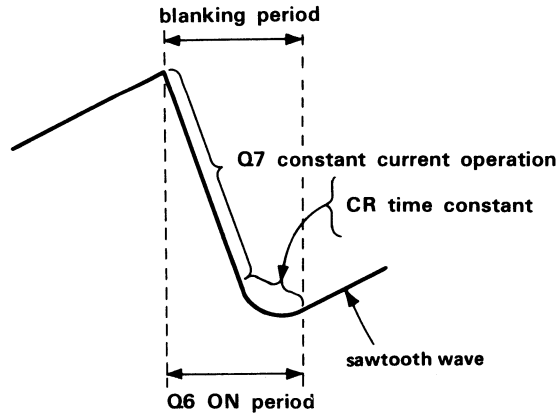


IC3 (1/2)'s positive terminal is biased to −2.5V dc by R17, R18, R19. The sawtooth is generated by a Miller integrator of R20, C9. This Miller integrator output is increasing linearly during when Q6 is OFF (scanning period).

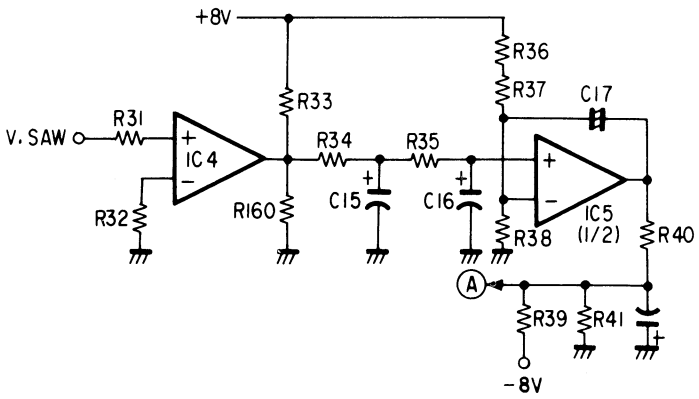
When Q6 is turned ON (blanking period), Q7's source-drain circuit is shorted so that the output voltage is sharply c=decreased as shown in the following illustration (1), with the C9, R23 time constant, until −2.5V.



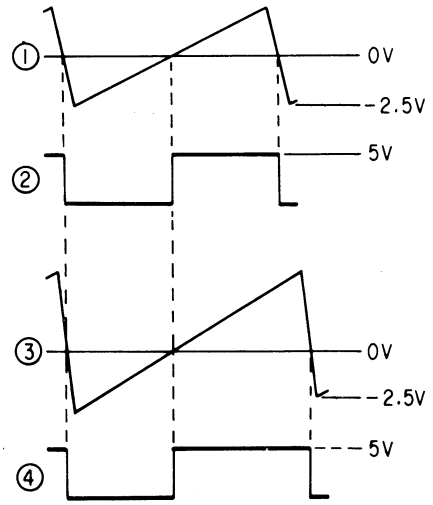
If this output signal is directly input to the V. OUT, a sharp (Vp=-L × delta i/delta t). The high amplitude blanking pulse causes on V.OUT saturation and also ringing. To prevent the ringing, the wave-form is changed into the signal that is shown as (2) in the illustration.
This wave-form change is done by the following circuit operation. As Q6 is turned ON, its collector voltage becomes −2.2V (−2.5V + 0.3V V_{ce}) that is routed through R23, R25, and then to IC3 2/2's - negative input. Its positive input receives the signal shown as (3) in the illustration that is the vertical pulse after clipped by R30, D1,and after biased by R26, R27, R28, R29. The FET Q7's impedance is controlled by IC3 (2/2) until Q7 drain reaches −2.0V.
Then the voltage across R23 becomes −2.2V − (−2.0V) so that the constant current operation is started. As C9 voltage is decreased, Q7 is turned ON to realize C9, R23 curve.
The above explanation is shown as follows.



The frequency detector circuit is discussed as follows.



The sawtooth wave that is generated by the afore-mentioned sawtooth wave generator circuit, (shown in the following illlustration) is passed through R31 and is input to IC4 (μPC311C) zero-cross comparator where sawtooth signal is formed into rectangular wave as shown below. This rectangular wave is converted into dc voltage by the integrator circuit of R34, C15 and R35, C16. If the following wave form is 50/50, the dc voltage becomes 2.5V.



IC5 (1/2)'s ⊖ terminal is biased to 2.5V by R36, R38 while its output terminal is biased to ⊖ potential by R39, R40, R41, and is connected to the point Ⓐ of the afore-mentioned sawtooth wave generator circuit. If the point Ⓐ potential is increased, the voltage across R20 becomes small that reduces C9 integrating curren, and reducing the sawtooth wave amplitude samll.

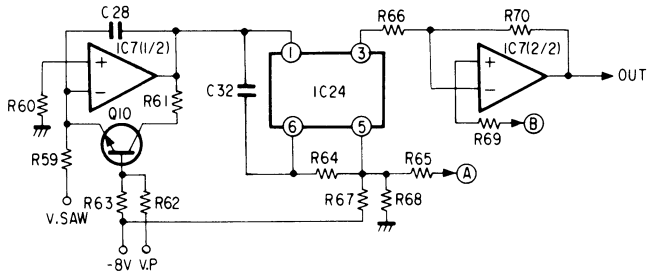
If the low frequency sawtooth signal is input, the IC4 output loses 50/50 duty cycle that results in increase of integrator output.

Then the IC5 (1/2) output voltage is increased which increases the point Ⓐ, decreasing the sawtooth signal's amplitude. Then the waveform re-gains 50/50 duty cycle so that entire circuit's operation is stabilized.

This circuit operates so that the comparator output shold have 50/50 duty cycle where the sawtooth signal amplitude is determined by R17, R18, R19 (negative signal area) and R36, R37, R39 (positive signal area).

VERTICAL PARABOLIC SIGNAL GENERATOR (DA BOARD)

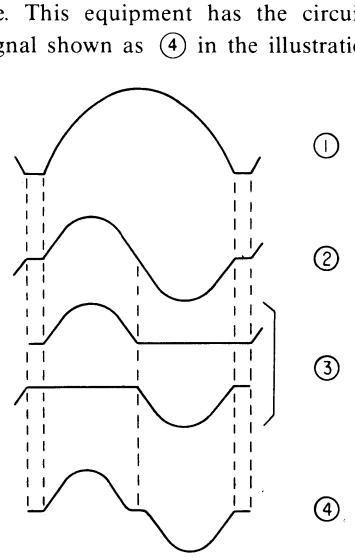
Since this circuit has the zero-clamp function and the peak-clamp function, its output signal's amplitude is not affected by frequency change.



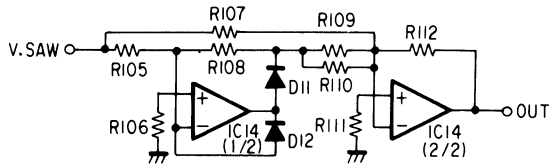
IC7 (1/2) and Q10 are generating the parabolic signal. Since this circit is of common Miller integrator, explanation is omitted. IC24 is a MOS FET that is functioning as the voltage-controlled variable resistor. Its resistance value between pin-① to pin-③ can be controlled by the dc voltage that is applied to pin-⑤. The point Ⓐ in the illustration is receiving the peak-clamp controlling voltage that is supplied from IC8 (1/2). The point Ⓑ in the illustration is receiving the zero-clamp controlling voltage that is supplied from IC8 (2/2). The clamp pulse for the peak-clamp operation is the vertical pulse as it is. The clamp pulse for the zero-clamp is obtained by differentiating the sawtooth generator's frequency detector circuit's rectangular output which is the rise-up pulse.

VERTICAL SINUSOIDAL WAVE GENERATOR (DA BOARD)

Sinusoidal wave (② in the following illustration) can be obtained by integrating a parabolic signal (① in the following illustration) in general. But if the parabolic signal is divided into two, as shown in ③ of the illustsration, a horizontal bar will be the result on monitor screen. In order to prevent the horizontal bar, the sinusoidal signal shown as ④ in the illustration should be prepared. This signal cannot be obtained by integrating the parabolic wave. This equipment has the circuit design to produce the signal shown as ④ in the illustration.

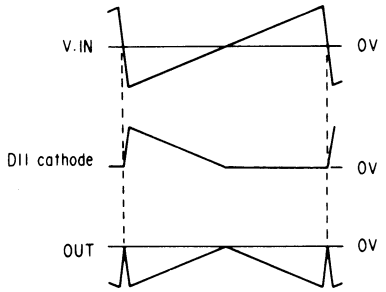


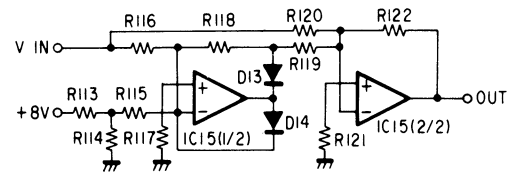
The circuit shown is a common full-wave rectifier circuit. Sawtooth wave signal is supplied to its input. When D11 $V_{IN} \leq 0$, $-R108/R105 \times V_{IN}$ is established. If $V_{IN} > 0$, D11 is turned off to 0.

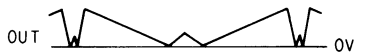


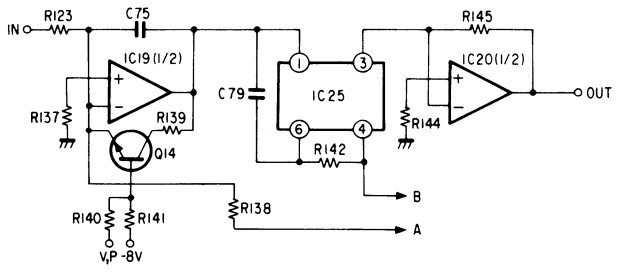
R105 = R107 = R108 = R109 = R110 = R112

This output signal and the V_{IN} are current-mixtured by IC14 (2/2) through R109//R110 and R107.the signal shown as follows is obtained. This output is again input to a full-wave rectifier as shown below. Since the input of this circuit is dc-biased by R113, R114, R115, the sawtooth signal's center is rectified as shown in the following illustration. Output of this circuit is again input to the IN terminal of the circuit as shown.

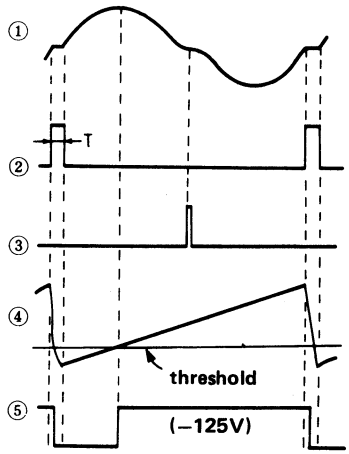






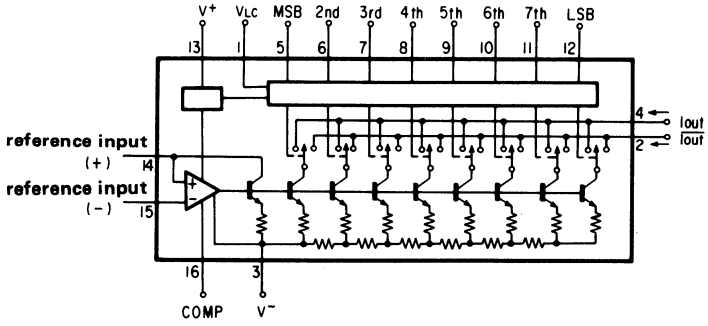


IC193 and Q14 form a Miller integrator where the IN signal is integrated. The zero clamp pulse (same signal as used in the parabolic signal zero clamping) is input to Ⓐ from IC21 (1/2) providing the clamping control voltage, shown as ③ in the illustration. Signals ④ and ⑤ in the illustration are showing the timing chart of the clamp pulse for the peak-clamping. The threshold voltage shown as ④, is obtained from the Ⓑ center point between R18, R19 bias resisters of −2.5V as described in the vertical sawtooth generator circuit. This threshold voltage and the sawtooth wave signal are input to the comparator and the signal shown as ⑤ in the illustration is obtained. Its differentiated pulse's rise-up edge is formed into pulse by IC9 (4/4) so that its output pulse is used as the clamp pulse. The control voltag is input to point Ⓑ from IC21 (2/2).



Waveform Dividing Circuit

The waveform division is done by using the multiplier type D/A convertor. The D/A convertor circuit is shown in the following illustration where the reference input current value is divided equally by 256 from MSB data to LSB data so produce the I_{OUT} output signal. If 2 mA current is introduced to the reference input ⊕, while the reference inputs ⊖ are imaginate-short-circuited, and the data are FF (8 lines from MSB to LSB are all HIGH), following results are obtained.



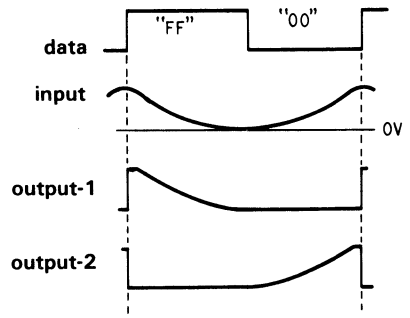
$$Io = 2mA \times \frac{255}{256} = 1.992mA,\ \overline{Io} = 2mA \times \frac{0}{256} = 0mA$$ となる。

If data are set to "00", the following results are obtained.

$Io=2\ mA\times\frac{0}{256}=0\ mA$, $Io=2\ mA\times\frac{255}{256}=1.992\ mA$

Nextly, the priciple to divide the parabolic signal is explained as follows.

This division is realized by the D/A convertor of IC11, IC13 and operational amplifier of IC12. The vertical parabolic signal input flows the parabolic current into the D/A convertor (IC11, IC13)'s reference input ⊕ (pin ⑭), through R97, R101.



Since the input signal current is⊕, it is connected to the⊕input terminal. After data lines of D0 through D7 (from pin- ⑤ through pin- ⑫) are connected, the recutangular wave signal that is produced from the vertical sawtooth signal, is input through Q13.

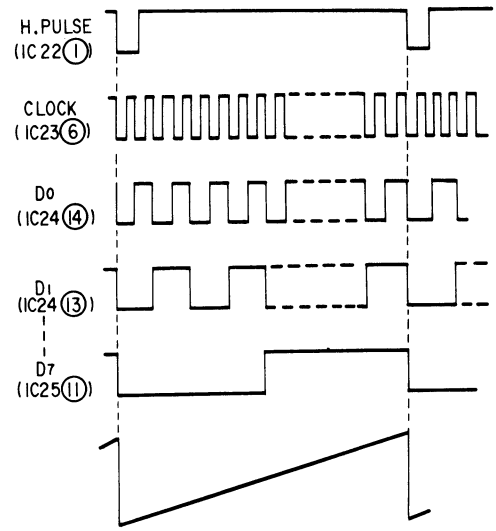
As long as the data are "FF", the IC13's output curent (pin-④) is converted to voltage by IC12 (2/2), so that the output "1" waveform is obtained. While the data are "00", the IC11 output current (pin-②) is converted into voltage by IC12 (1/2) so that the output "2" is obtained.

This is the method to divide the parabolic wave signal into two parts.

Regarding the sinusoidal wave signal, the right half of the signal (that is the lower half of screen) is the negative voltage, so that the input to the D/A convertor is fed to the ⊖ terminal (pin- ⑮) of IC16. The rest of operation is identical to that of parabolic dividing circuit operation.

PLL (D_B BOARD)

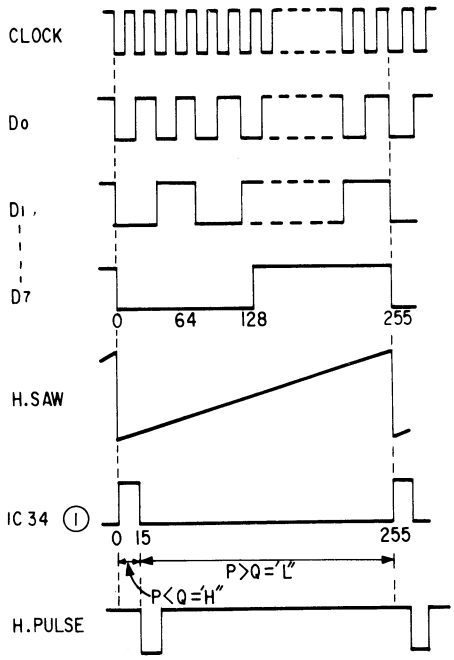
The horizontal rate correction waveform and modulation waveform are generated in this board. All the horizontal rate waveforms are generated by all digital circuits



The PLL is used to synchronize the horizontal deflection and the horizontal correction signal. The horizontal pulse is input from the horizontal deflection into IC22- ① pin. The clock signal is obtained from IC23- ⑥ pin and it drives the IC24, IC25 counter. The output MSB from IC25- ⑪ pin is returned to IC22- ③ pin. The synchronization between the horizontal pulse and the counter is thus established. The horizontal sawtooth signal is obtained by feeding the counter's output 8 bit to the D/A converter input.

This horizontal sawtooth correction signal is amplified and then supplying correction current through the SUB DY so that the registration is corrected. However, the correction signal is phase-delayed with this relationship between the horizontal pulse and horizontal sawtooth. Therefore, this correction signal is phase-advanced by IC34, SW4. The IC34 is called as 8 bit MAGNITUDE COMPARATORS that has two 8-bit inputs of P and Q.

The inputs P and Q are compared. If P>Q is input, pin- 1 is set "L". The P input receives the counter's output in the D_B board, while the Q input is preset by SW4.

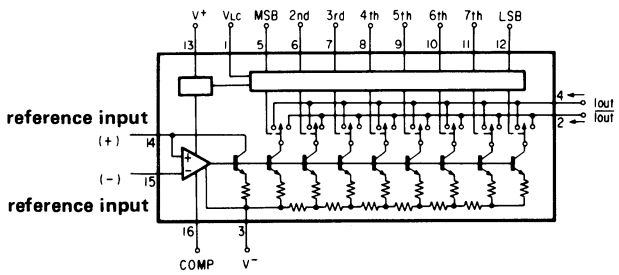


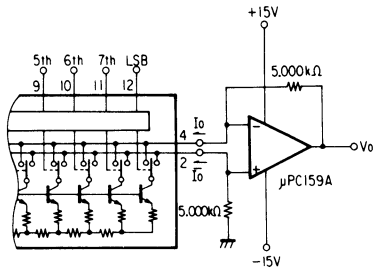
The present range is from 0 through 15. If preset is set to "15", the IC34-① pin will have the signal as in the illustration. Since this PLL synchronizes at the fall-down edge, the horizontal pulse becomes as shown in the illustration, showing that the horizontal sawtooth signal advances to the horizontal pulse. This preset value of "2" is appropriate in the HDVS.

HORIZONTAL SAWTOOTH WAVE GENERATOR (DB BOARD)

The principle to generate sawtooth wave signal by connecting counter output into D/A converter.

The D/A converter block diagram is shown. The reference input ⊖ terminal is imaginage-short-circuited while the reference input ⊕ terminal is connected to the reference voltage source through resistor. If the reference voltage of 10V is connected to input through 5k ohms, the 2mA IREF flows, the output I_{OUT} and the inverted $\overline{I_{OUT}}$ will change according to the 8-bit data inputs, as shown.





	MSB	2nd	3rd	4th	5th	6th	7th	LSB	Io (mA)	$\overline{Io}$ (mA)
Full Scale	1	1	1	1	1	1	1	1	1.992	0.000
Full Scale −1LSB	1	1	1	1	1	1	1	0	1.982	0.008
Half Scale +1LSB	1	0	0	0	0	0	0	1	1.008	0.984
Half Scale	1	0	0	0	0	0	0	0	1.000	0.992
Half Scale −1LSB	0	1	1	1	1	1	1	1	0.992	1.000
Zero Scale +1LSB	0	0	0	0	0	0	0	1	0.008	1.982
Zero Scale	0	0	0	0	0	0	0	0	0.000	1.992

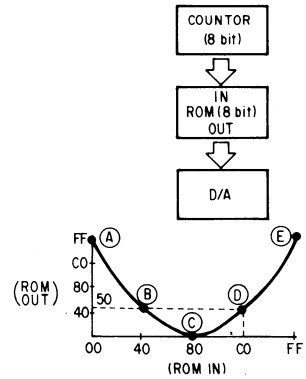
The 8-bit output from the counter is "0" (00) at the begining of scanning, is "128" (80) at the center of scanning, and is "255" (FF) at the end of scanning. The output Io and the inverted output $\overline{Io}$ will change from MAX to MIN and from MIN to MAX, respectively. After this current output is converted from current into voltage, the output sawtooth is obtained.

Horizontal Parabolic Signal Generator (DB Board)

Using the same principle as the generation of sawtooth signal, as discussed in the previous paragraph, the 8-bit output from counter is fed to D/A converter to generate analog signals. But, the parabolic signal, sinusoidal signal and desired signals can be generated by inserting ROM in between the 8-bit counter output and the D/A converter input.

ROM data are shown.

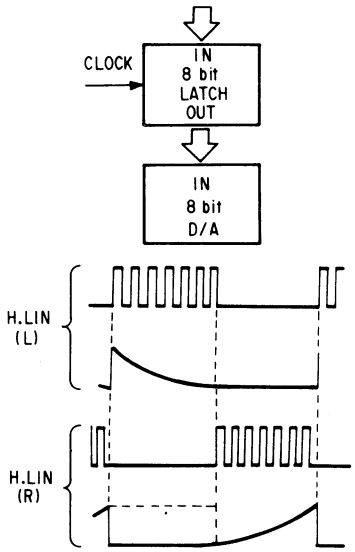
IN	OUT	position in the illustration
00	FF	Ⓐ
40	approximately 5.0	Ⓑ
80	00	Ⓒ
CC	approximately 5.0	Ⓓ
FF	FF	Ⓔ



The typical five points are described, but 256 data are input in practice such as 00,01,02 ..... FD,FE,FF so that Ⓐ to Ⓑ to Ⓒ to Ⓓ to Ⓔ so on are made smooth.

CP2005S

The type PC624C D/A converter is used only in the horizontal sawtooth generation. Other signals such horizontal parabola, horizontal sinusoidal and the division signals are generated by using the type CP2005S IC.



The detailed explanation is made in the DC board circuit description, but the operating principle is as follows.

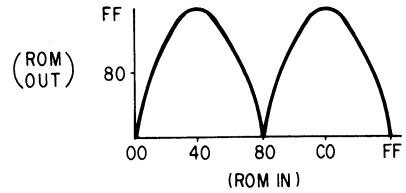
As the block diagram of principle is showing, the u-bit data are connected to the latch and then to the D/A converter. The clock signal is required for the 8-bit word, but the clock signal is divided into left half and right half as shown in the illustration.

In producing the horizontal linearity signal (left), the left side output has the sawtooth output because of existense of clock input, but the left half of the output becomes "00"=0V, because the clock input for the left half is "00".

The right half of the screen has small change. Since clock input is existing in the right half, the D/A output will provides sawtooth output in the right half. There is no difference so far. But the last clock's data is "FF", not "00", so that the high "FF" output will continue as shown by the dotted line in the ilustration. In order to prevent this continued high output, the ROM data is changed. Reminding the afore-mentioned horizontal parabolic signal generator's explanation, the ROM input of "FF" will produce the ROM output of "FF", but in this circuit only, the ROM's "FF" input will produce the ROM's output of "00". So the last clock data will produce output of "00", as shown in the solid line in the illustration.

HORIZONTAL SINUSOIDAL WAVEFORM GENERATOR (DB BOARD)

This generator can be made by using the ROM that has the data content as shown below, in the circuit as discussed in the horizontal linearity signal generator.

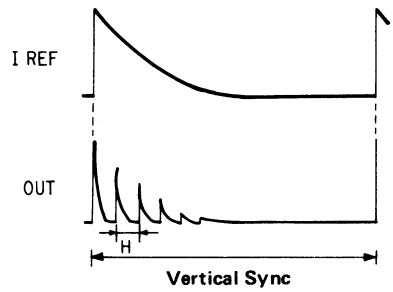


Modulation Signal Waveform

The signal shown in the following illustration is the correction waveform to be applied to the left-top of screen.

In the case of the horizontal parabolic generator, the I_{REF} is input from the high precison reference voltage source throu resistor, functioning as the dc current. This I_{REF} determines the signal amplitude of the horizontal parabola. The modulation waveform is generated by using this principle of I_{REF}.

If the vertical parabola (top) (left), is input inplace of the high precison reference voltage, the I_{REF} signal becomes the vertical parabola (top) current. As this output I_{REF} is input to the horizontal linearity (left) signal generating circuit, the output as shown in the illustration is obtained. The screen's top right correction signal is generated from the vertical parabola (top)'s I_{REF} and the horizontal linearity (right) signal. The bottom left correction signal is generated from the vertical parabola (bottom)'s I_{REF} and the horizontal linearity (left) signals. The screen's right bottom correction signal is generated from the vertical parabola (bottom)'s IREF and the horizontal linearity (right) signals.



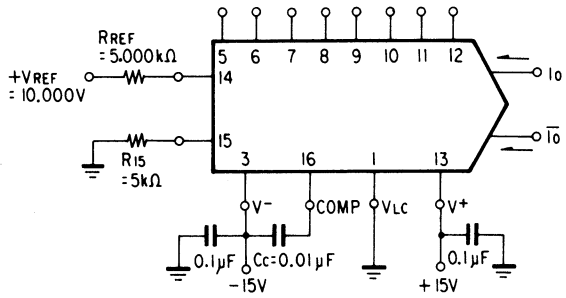
Dc BOARD

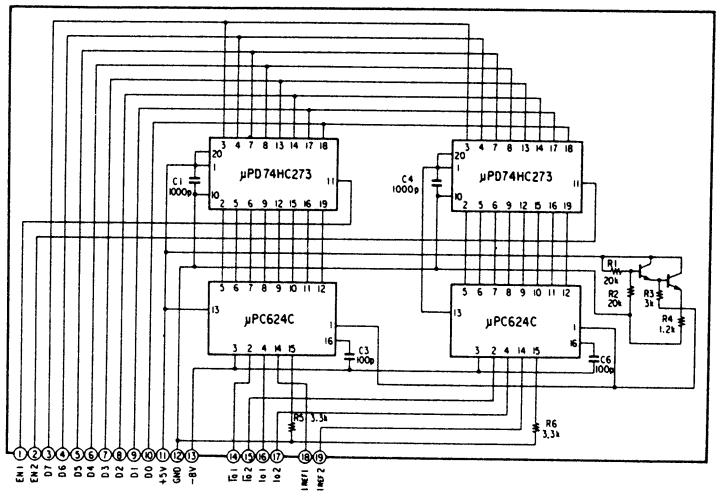
The correction signals that are generated by the D_A, D_B boards are controlled by the CPU regarding their amplitude and polarity. The CP2005S type IC is used. This is a hybrid IC packaged in plastic mold. The circuit is shown in the following illustration.

This IC has two sets of the pair of 8-bit D/A convertor and 8-bit latch. The D/A convertor is already explained in the D_A, D_B board already, but repeat a bit again. If 10V dc is applied as the V_{REF} and 5k ohms are used as the R_{REF} (reference resistor),the I_{REF} (reference current) becomes as follows.

$$\frac{V_{REF}}{V_{REF}}=10/5\times10^3=2\ \text{mA}$$

The I_O + inverted $\overline{I_O}$ becomes $I_{REF} \times 255/256$. The ratio of $\overline{I_O}$ and the inverted I_O can be changed by the data input.

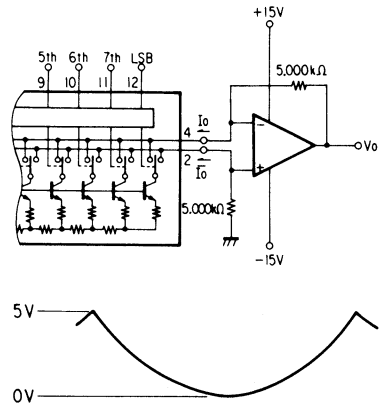




The following illustration shows the the current-to-voltage conversion circuit. This circuit converts the I_O and the inverted $\overline{I_O}$ current output into the voltage output. If input data from "00" through "FF" are input to this circuit, the output voltage of ±10V is obtained. In the DC board in particular, the correction signal is input to the V_{REF} input.

If the parabolic voltage as shown below is input while R_{REF} is 4.7k ohms, approx. Approx lmA parabolic carrent.

$$I_{REF}=\frac{V_{REF}}{I_{REF}}=5/4.7\ \text{k}\Omega=1.06\ \text{mA}$$



If the input data are "FF",

$$\begin{cases} Io=\frac{255}{256}\times1.06\ \text{mA p-p}=1.056\ \text{mA} \\ Io=\frac{0}{256}\times1.06\ \text{mA p-p}=0\ \text{mA} \end{cases}$$

+ 5.28V=1.056mAx5.0k ohms parabolic voltage is output.

If the input data are "00",

$$\begin{cases} Io=\frac{0}{256}\times1.06\ \text{mA}=0\ \text{mA} \\ Io=\frac{255}{256}\times1.06\ \text{mA}=1.056\ \text{mA} \end{cases}$$

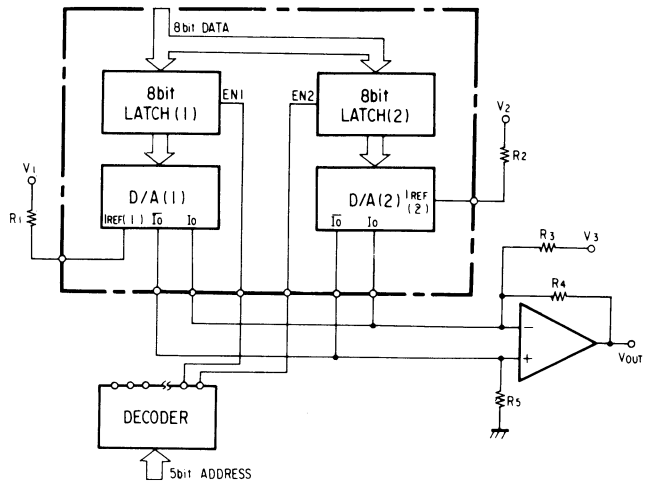
the output ⊖ 5.28V=1.056 mA×5.0k ohm parabolic voltage that is inverted signal from the input, is obtained.

If the input data are "80",

$$\begin{cases} Io=\frac{128}{256}\times1.06\ \text{mA}=0.53\ \text{mA} \\ Io=\frac{127}{256}\times1.06\ \text{mA}=0.526\ \text{mA} \end{cases}$$

the output of ⊕ 0.02V=0.53 mA×5.0k ohms parabolic voltage is obtained.

As discussed already, the amplitude and polarity of the correction waveform can be adjusted by the input digital data. The IC type CP2005S has two sets of the pair of the aforementioned D/A convertor and 8-bit latch. The block diagram is shown.



The 5-bit address from the CPU determines the lcation and the 8-bit data from the CPU too determines data. Therefore, the 5-bit address and the 8-bit data from the CPU drives the latch that is corresponding to the point to be adjusted on monitor screen, and change the data. If the latch-(1)shown in the last illustration is driven, the D/A convertor-(1) data is changed so that the correction signal of V1 becomes I_{REF} by R1 and is output to V_{OUT}. The maximum output voltage is determined by the R1 resistor's value, if V1 is of fixed value.

If the latch-(2) address is designated by the CPU, the D/A convertor-(2) driven so tat the V2 correction waveform can be adjusted. These two correction waveforms of V1 and V2 are connected directly to respective D/A convertor's Io and $\overline{Io}$, so that they are current -added and then fed to operational amplifier where current is converted into voltage.

In practice, the numbers of D/As that is equal to the number of correction points are connected, and all Ios and inverted Ios are connected in parallel.

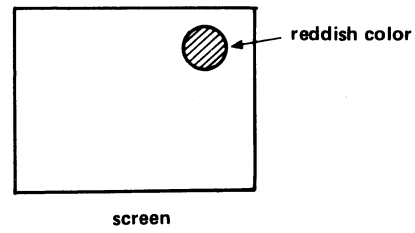
The V3 correction waveform shows the connection method when the correction value is of fixed value, or the correction value is already obtained in the separate circuit so that the correction value is added here.

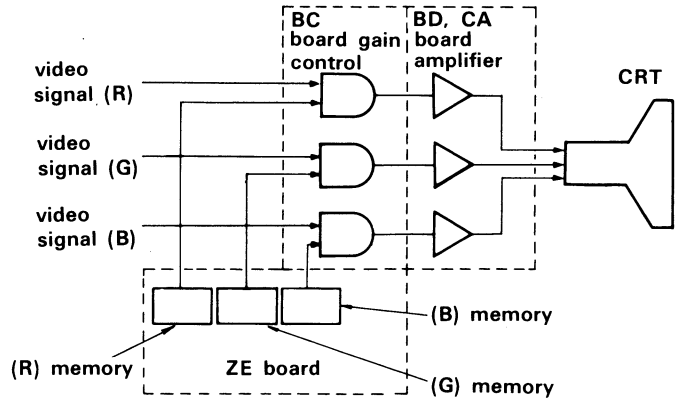
In this case, the correction value is determined by R3, and the parallel values of R3, R4 should be of R5 value.

Principle of Uniformity Correction

If a certain point of the CRT shows reddish color, color of this point can be of same color as other points by adjusting the the red channel video signal's amplitude only at this point.

Therefore, the monitor screen is divided into numerous point, and the R,G,B correction data that are corresponding to each picture element are memorized in each memories. In synchronizing with the scanning, the data are read-out from these memories. These output data are used as the correction signals to be used for each channel's gain control. The video signal amplitude can be dynamically adjusted.

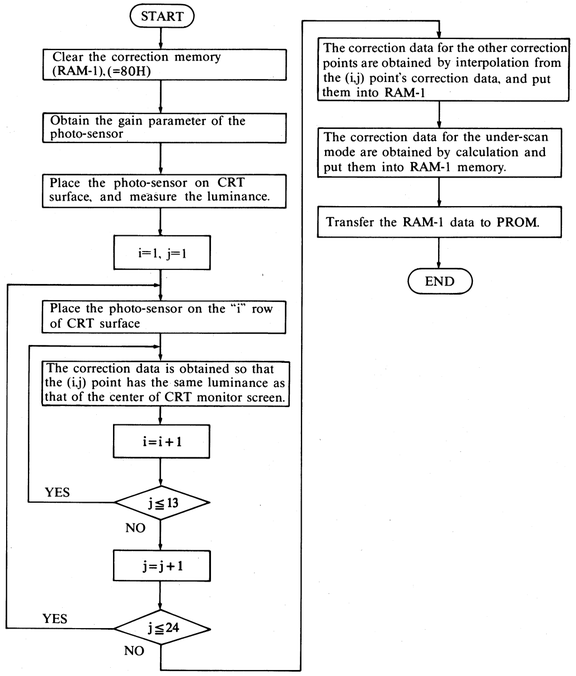


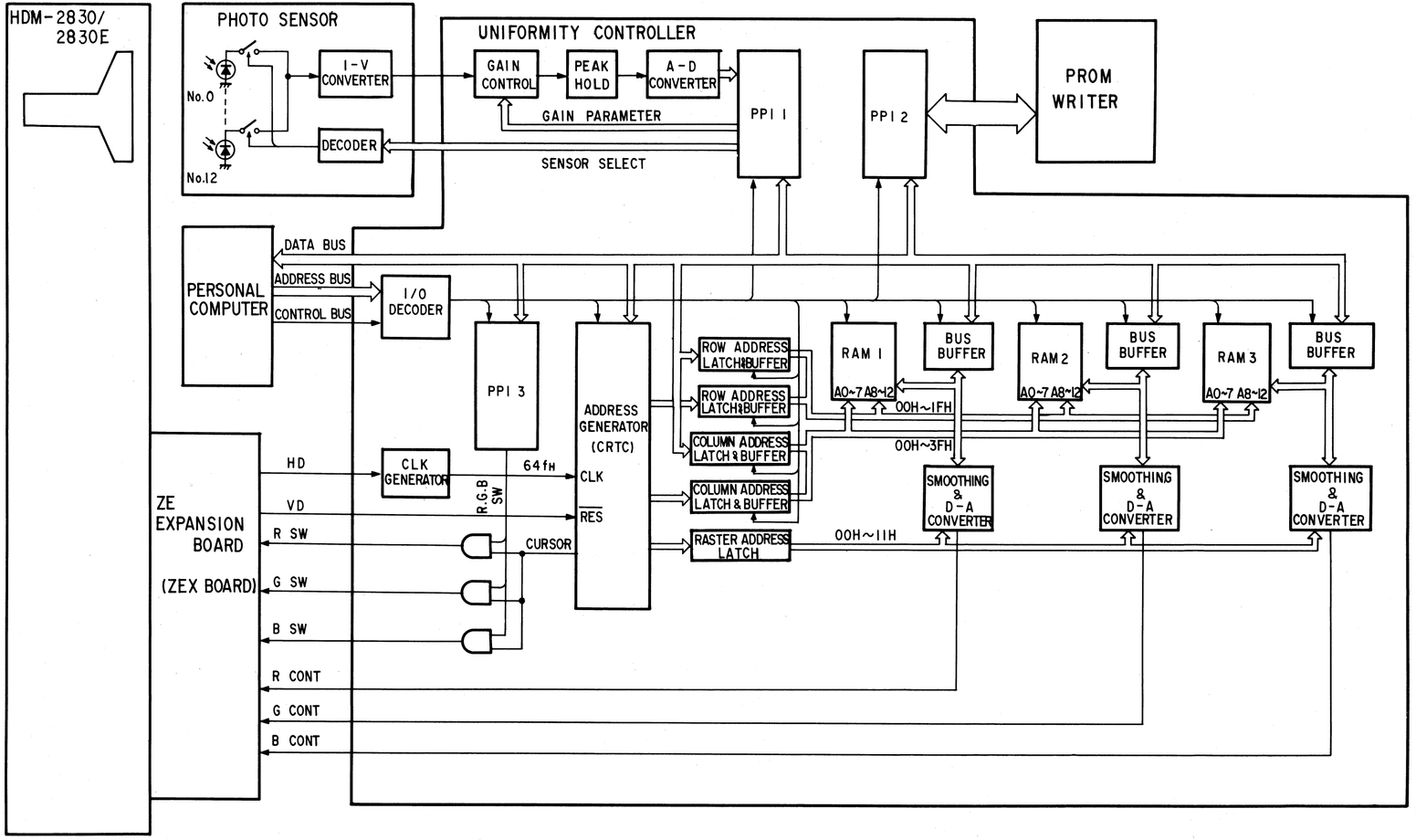


The correction data can be obtained by placing photo diode on the specific point of CRT, measuring luminance, and changing the memories' data.

Uniformity Controller

The uniformity controller is the jit to be used for making the uniformity correction data. The block diagram and the flow chart are shown in the illustrations. The photo-sensor is made of 13 pieces of photo-diodes, current-to-voltage convertor and analog switch. The measuring points are as many as 13 points vertically by 24 points horizontally. The vertical 13 points are measured simultaneously by the 13 photo-diodes. The correction points are as many as 27 points vertically by 55 points horizontally. The data for the other points than the measuring points on monitor screen, are generated by the interpolation method between the surrounding measuring points' data. It will be discussed later.

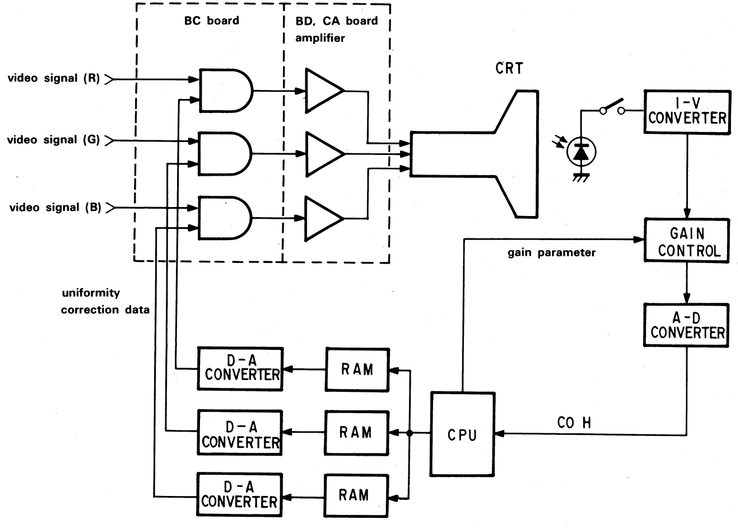




Method to Obtain the Gain Parameter

In order to shorten the measuring time, the 13 pieces of photo diode are located vertically so that vertical one row is measured at once. However, 13 pieces of photo diode have different sentivity and have also different sensitivity to **G, B, R** colors that necessitates correction for sensitivity. This correction value is the gain parameter. This correction is performed by changing the digital input value to the gain control.

The method to obtain the gain parameter is discussed as follows. The CRT screen is set to display a single color. Place the sensor No.0 at the center of screen. Calibrate the gain control so that the luminance data (input to PP11) under this condition, has a constant value (COH for example). Transfer this gain control data obtained (gain parameter), to memory. Obtain the gain parameter regarding to the other two colors. Obtain the gain parameter of other 12 pieces of sensors by placing them at the center of screen, each by each, in the same manner as the no.0 sensor's procedure. Therefore, total 13 sensors have each 3 gain parameters for **G,B,R** respectively.



Method to Obtain Uniformity Correction Data

The uniformity correction data are the values that each points of CRT may have the same brightness as that of the center of screen.

Therefore, the brightness at the center of screen is measured by sensor, and the measured data are transfered to personal computer.

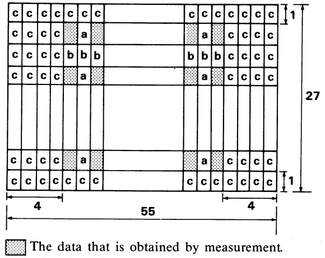
The correction data are obtained as follows.

In measuring the correction data at the top-left of screen, for example, the red channel correction data are obtained first. At this time, the sensor No.0 is accessed by the personal computer via uniformity controller's PPI-1 (Programmable Peripheral Interface). The sensor No.0 red channel gain parameter is transferred to the gain control. The G, B, R switching signal is sent to the BC board of HDM 3830/3830E so that the screen displays uniform red color only. As placing the sensor No.0 at the top-left of the screen, the brightness data at this point is transferred to the personal computer. The personal computer output the rec control signal so that the brightness at this point becomes equal to that at the center of screen. The red channel brightness data that is obtained when the both brightness data becomes equal, is the red channel uniformity correction data that is housed in the RAM-1. The correction data for green and blue channels are obtained in the same manner and are housed in the RAM-2/-3 respectively.

The left most vertical one line is accessed and all the correction data for each point of vertical line are obtained by the sensors No.1 through No.12. By repeating this operation 24 times, all the correction data for all the points of vertical 13 by horizontal 24 points, are obtained.

Data Interpolation

The correction data for each measuring points of vertical 13 by horizontal 24 points are thus obtained. But the uniformity correction becomes rough due to insufficient numbers of data. So the correction data of vertical 27 by horizontal 55 points' data are calculated and are used.



The data that is obtained by measurement. (13 × 24 points)

a. The data that is obtained by averaging the left measuring point and right measuring point.

b. The data that is obtained by averaging the upper measuring data and the lower measuring data.

c. The outer circumference data are same as that of most outer data.

ROM'S MEMORY MAP

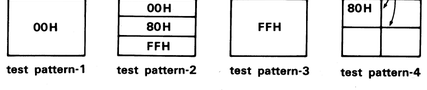
The uniformity correction data are housed in ROM. The ROM is installed in the ZE board that control the BC board's gain control.

Relation between the ROM data and the gain of the gaincontrol is shown as follows.

data	gain
00H	MIN.
80H	0dB
FFH	MAX.

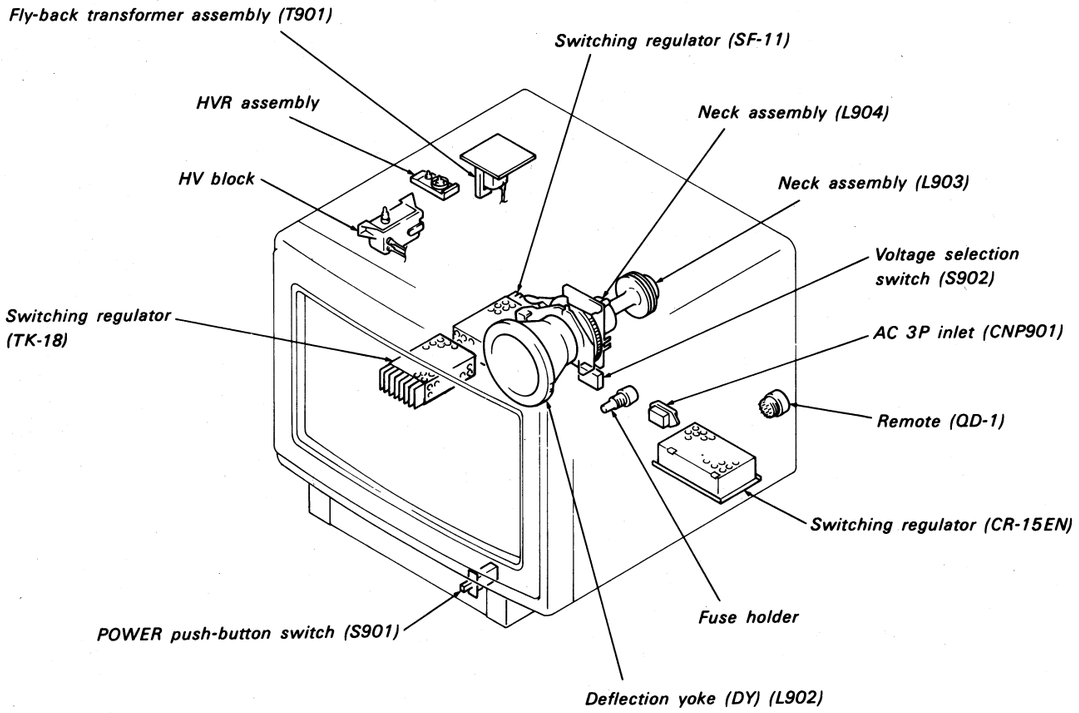
The ROM's memory map is shown as follows. The selection from position 0 through 7 is done by the switch SW1 on the ZE board.

position	address	content of data
0	0000H~	uniformity correction data
	0800H~	(normal scan)
1	1000H~	test pattern-1
	1800H~	(normal scan)
2	2000H~	test pattern-2
	2800H~	(normal scan)
3	3000H~	test pattern-3
	3800~	(normal scan)
4	4000H~	test pattern-4
	4800~	(normal scan)
5	5000H~	undefined
	5800~	
6	6000H~	undefined
	6800~	
7	7000H~	undefined
	7800~	

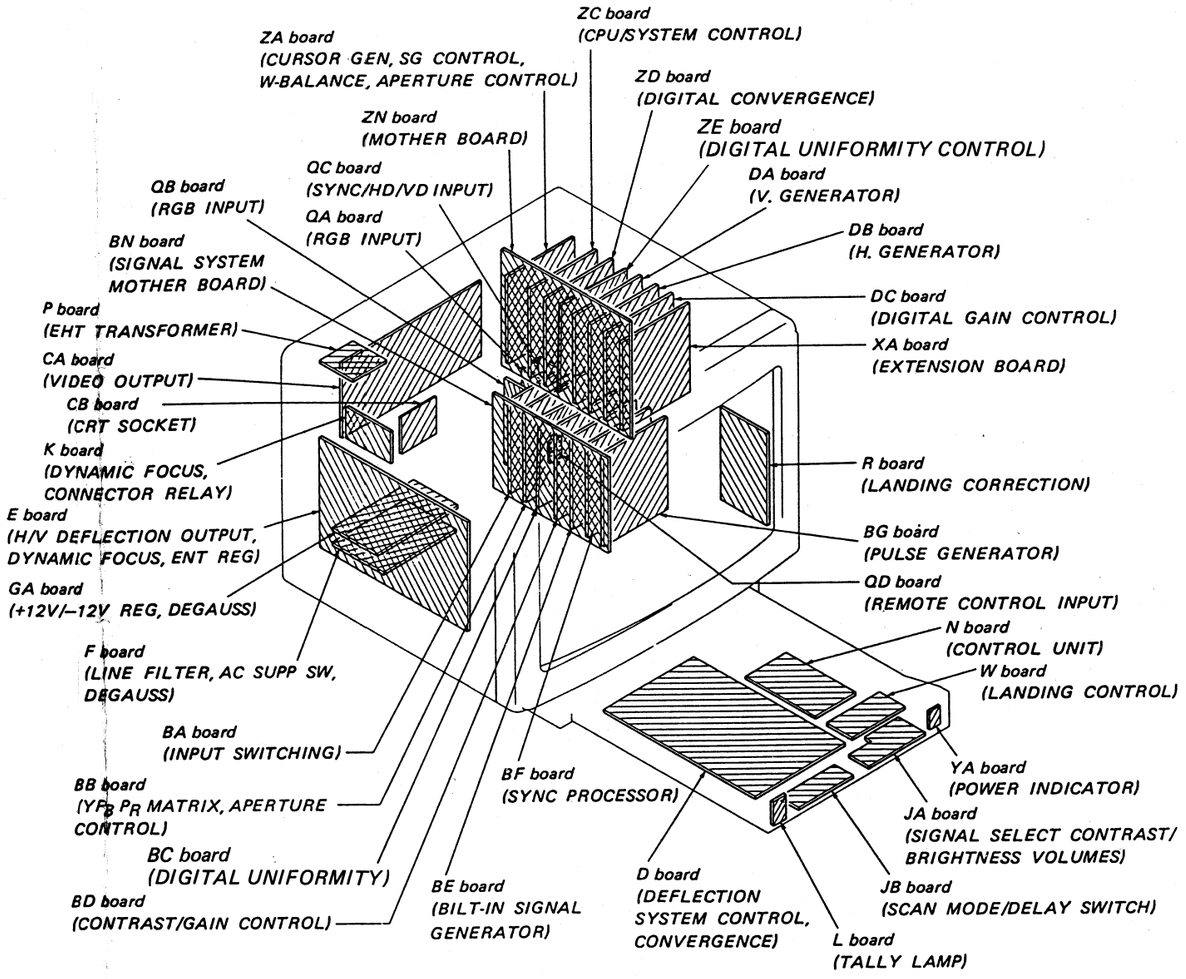


SECTION 4
ADJUSTMENT

4-1. INTERNAL VIEW DIAGRAM



4-2. BOARD ARRANGEMENT DIAGRAM



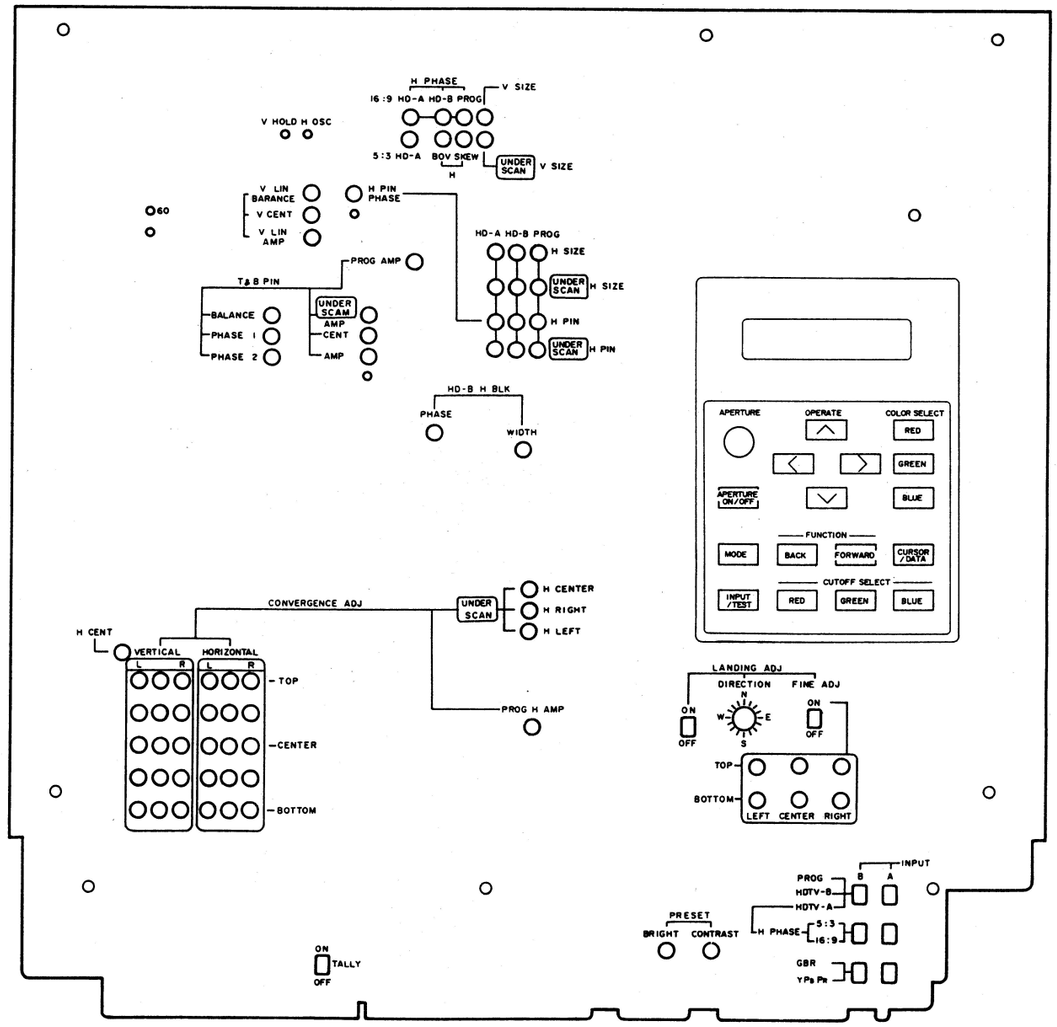
4-3. QUICK REFERENCE

BOARD / SECTION	BA	BB	BC	BD	BE	BF	BG	BN	CA	CB	D	DA
CIRCUIT DESCRIPTION	3-18	3-19	3-21	3-12 3-22	3-23	3-24	3-12 3-14 3-24	—	3-14 3-27	—	3-1	3-32
ADJUSTMENTS	—	4-40	4-42	—	4-44	4-45	4-49	—	4-51	—	4-25	4-35
BLOCK DIAGRAM	5-1	5-2	5-2	5-3	5-2	5-2	5-3	—	5-4	5-14	5-12	5-10
MOUNTING DIAGRAM	5-21	5-29	5-35	5-37	5-45	5-47	5-57	5-59	5-64	5-66	5-70	5-81
SCHEMATIC DIAGRAM	5-23	5-27	5-32	5-39	5-43	5-49	5-53	5-61	5-67	5-69	5-73	5-78
ELECTRICAL PARTS LIST	7-1	7-15	7-12	7-3	7-19	7-21	7-23	7-12	7-27	7-27	7-42	7-32

BOARD / SECTION	DB	DC	E	K	P	GA	F	JA	JB	L	YA	N
CIRCUIT DESCRIPTION	3-36	3-39	3-7	—	—	3-10	3-9	—	—	—	—	3-28 3-30
ADJUSTMENTS	4-36	—	4-27	—	—	—	—	—	—	—	—	—
BLOCK DIAGRAM	5-9	5-8	5-12	5-13	5-12	5-13	5-13	5-4	5-4	5-5	5-5	5-6
MOUNTING DIAGRAM	5-83	5-91	5-94	5-94	5-94	5-105	5-105	5-105	5-106	5-106	5-106	5-107
SCHEMATIC DIAGRAM	5-85	5-88	5-97	5-99	5-99	5-103	5-102	5-104	5-104	5-104	5-103	5-109
ELECTRICAL PARTS LIST	7-35	7-36	7-37	7-51	7-6	7-26	7-8	7-50	7-51	7-52	7-50	7-58

BOARD / SECTION	QA	QB	QC	QD	R	W	ZA	ZC	ZD	ZE	ZN	XA
CIRCUIT DESCRIPTION	3-17	3-17	3-17	—	3-11	3-11	3-28 3-30	3-28 3-30	3-28 3-31	3-31	—	—
ADJUSTMENTS	4-38	4-39	4-39	—	4-37	4-37	—	—	—	4-53	—	—
BLOCK DIAGRAM	5-1	5-1	5-1	5-1	5-14	5-13	5-7	5-6	5-7	5-10	—	—
MOUNTING DIAGRAM	5-111	5-111	5-111	5-112	5-116	5-117	5-125	5-127	5-135	5-141	5-143	5-148
SCHEMATIC DIAGRAM	5-113	5-113	5-113	5-113	5-119	5-120	5-122	5-129	5-132	5-138	5-145	—
ELECTRICAL PARTS LIST	7-10	7-11	7-9	7-10	7-6	7-50	7-53	7-55	7-56	7-52	7-51	7-51

4-4. SUB CONTROL PANEL



4-5. SET-UP ADJUSTMENT

It describes the setting adjustment and adjusting method when the CRT is replaced.
Moreover, normally, the convergence and white balance adjustments should be performed with the volume of the subcontrol panel. (See SECTION 1 OPERATION.)

[JIG TOOLS AND MEASURING INSTRUMENTS REQUIRED]

1. Signal generator
2. Oscilloscope
   TEKTRONIX 2465 type or equivalent
3. Color analyzer
   MINOLTA TV-COLOR ANALYZER II or equivalent
4. Digital voltmeter
   Number of the effective digits: Over 5 digits
5. Tracking scope
   TAKEDARIKEN TR4110+TR4114T or equivalent
6. Pulse generator
   HP8007B or equivalent
7. FET probe
   TEKTRONIX P6201 (1.5pF, 10MΩ, 100:1) or equivalent.
8. Frequency counter
9. Beam landing adjusting jig

4-5-1. Setting adjustment

When the horizontal or vertical terrestrial magnetism strength differs by changing the setting of the location, the purity cannot be adjusted by the LANDING ADJ of the W board. In this case, the following adjustments become necessary.

Note: The terrestrial magnetism strength of the HDM-2830E has been adjusted to 0.25 gauss for the horizontal strength and 0.50 gauss (2830), 0.45 gauss (2830E) for the vertical strength at the time of shipment.

[WHEN IT IS SHIFTED TO A LOCATION WHERE THE VERTICAL TERRESTRIAL MAGNETISM STRENGTH DIFFERS]

- Purity adjustment is necessary.

1. Receive the white signal in the state of CONTRAST and BRIGHTNESS being preset (The manual switch is turned OFF.) and maintain the current flow for over 30 minutes.
2. Set it with the CUT OFF SELECT on the N board to green pure color.
3. Turn OFF the LANDING ADJ ON/OFF SW (SW2) on the W board.
4. Set degauss by pressing the DEGAUSS SW.
5. Remove the cabinet and adjust by turning the purity knob of the deflection yoke so that the center of the screen becomes brightest in green.

Note: An accurate landing adjustment can be achieved by using the beam landing adjustment jig.

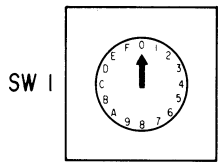
6. Turn On the LANDING ADJ ON/OFF SW (SW2) on the W board, after matching so that the DIRECTION SW (SW1) faces the front of the CRT and by making into single colors of red, green and blue, confirm that the respective colors are all pure..

[WHEN IT IS SHIFTED TO A LOCATION WHERE THE HORIZONTAL TERRESTRIAL MAGNETISM STRENGTH DIFFERS]

- The adjustment of the reference voltage of the direction correction signal (R board) becomes necessary.

1. Set the LANDING ADJ DIRECTION SW (SW1) on the W board to SE (6).
2. Connect a DC voltmeter to TP1 on the R board and adjust with RV1 so that it becomes TP1 = A (V).
3. Set the LANDING ADJ DIRECTION SW (SW1) on the W board to S (8).
4. Connect a DC voltmeter to TP3 on the R board and adjust with RV2 so that it becomes TP3 = B (V).

Note: The A and B differ depending upon the strength of the horizontal terrestrial magnetism (BH).



B_H (GAUSS)	0.1	0.2	0.3	0.4	0.5
A (V)	−0.67	−1.33	−2.00	−2.67	−3.33
B (V)	−1.00	−2.00	−3.00	−4.00	−5.00

4-5-2. Adjustment after Replacing CRT

The following adjustments become necessary after replacing the CRT.

- **Deflection yoke installation adjustment**

Note: This adjustment is unnecessary when the adjusted deflection yoke has been installed to the new picture tube.

- Purity adjustment
- LANDING ADJ preset adjustment
- Focus adjustment
- Convergence adjustment
- G2 adjustment
- Color temperature adjustment

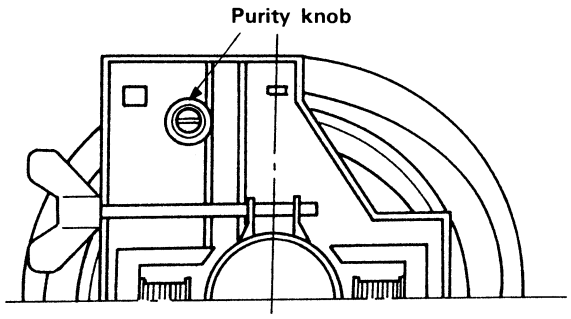
[DEFLECTION YOKE INSTALLATION ADJUSTMENT]

1. Receive the white signal, and maintain the current flow for over 30 minutes under the condition of the CONTRAST MANUAL and BRIGHTNESS MANUAL VR are being preset.
2. Press the CONTRAST MANUAL SW and turn the CONTRAST MANUAL VR fully clockwise. Turn OFF the LANDING ADJ ON/OFF SW (SW2) on the W board.

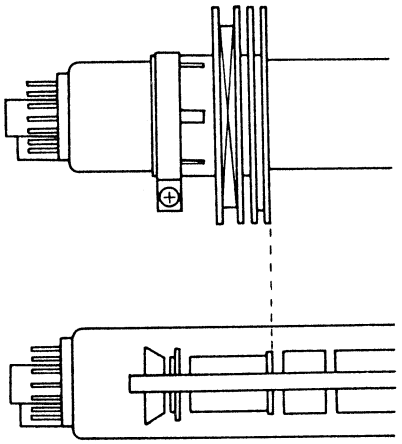
[PURITY ADJUSTMENT]

1. Set the purity knob to the mechanical center.

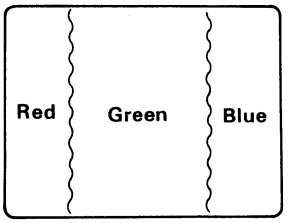
Note: Be sure to use the DEGAUSS switch after an interval of for over 5 minutes when it is used continuously.



2. Attach tightly the DY to the CRT.
3. Fix the Neck assembly to the position shown in (Fig. below).

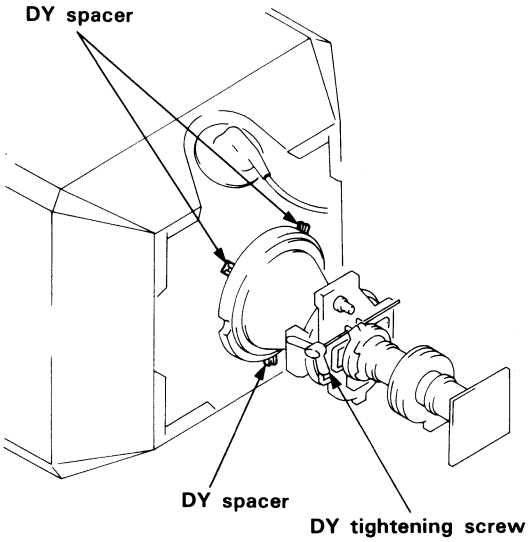


4. Make it into pure green color with the CUT OFF SELECT of the subcontrol panel (N board). Turn OFF the red and blue.
5. Adjust the purity magnet so that the green comes at the center of the screen.

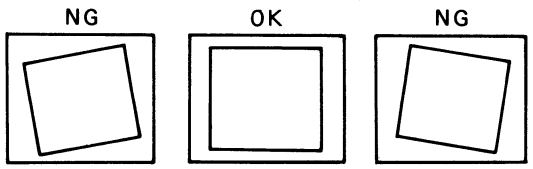


6. Pull back the DY and make the screen entirely green raster.
7. Adjust the screen into pure red color with the CUT OFF SELECT of the N board.
8. Perform the adjustments of steps 5 and 6 in red so that the entire screen becomes into pure red color.
9. Adjust the screen into pure blue color with CUT OFF SELECT on the N board.
10. Perform the adjustments of steps 5 and 6 in blue so that the entire screen becomes in pure blue color.
11. Be sure to confirm that the respective pure color rasters of red, green, and blue are not mislanding with one another.
12. Fix the DY. (Tighten the DY fixing screw.)
13. When there is a vertical misconvergence on the X axis, shake the DY neck and insert the wedge-shaped DY spacer between the neck and yoke.

Note: At this point, be sure to keep the V CONV (RV24 and RV34) of the sub control panel (D board) to the center.



14. Be sure to confirm that the raster does not skew.

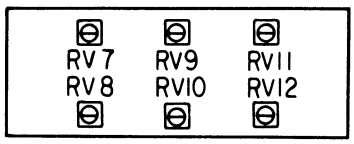


[LANDING ADJ PRESET ADJUSTMENT]

1. Remove the subcontrol panel within the drawer.
2. Be sure to confirm that the set is placed eastward and the white signal has been fed for over 30 minutes.
3. Set ON the LANDING ADJ ON/OFF SW (SW2) on the W board, set OFF the LANDING FINE ADJ ON/OFF SW (SW3) on it, and set the DIRECTION LANDING ADJ SW (SW1) on it to E (4).
4. Adjust with the CUT OFF SELECT on the N board so that it becomes into pure green color.
5. Press the DEGAUSS SW to demagnetize.
6. Adjust by turning the volumes RV9 and RV10 on the W board respectively so that the upper center section of the screen becomes the brightest and uniformly green with the former and the lower center section of the screen becomes the brightest and uniformly green with the latter.

Note: The purity is deviated a little by drawing out the drawer, so perform the adjustment by drawing it as little as possible.

W board

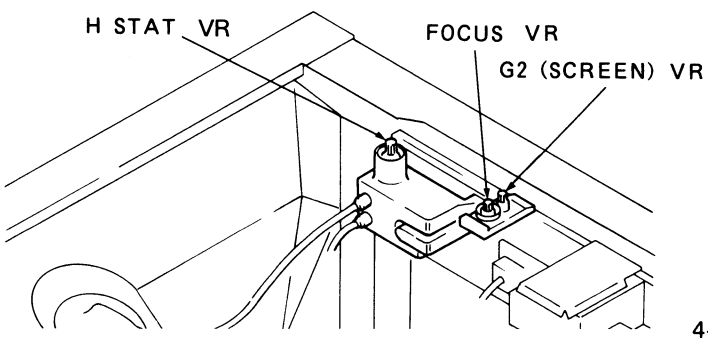


7. Similarly to the above, adjust with RV 7, 8, 11, and 12 so that the upper right and left sides and the lower right and left sides of the screen become bright and uniformly pure green color.
8. Press the DEGAUSE SW to demagnetize.
9. Be sure to confirm that the entire screen is in pure green color.
10. By setting the color of the screen in pure red color with the CUT OFF SELECT on the N board, be sure to confirm that the screen becomes in pure red color. By setting the color of the screen in pure blue color with the CUT OFF SELECT on the N board, be sure to confirm that the screen becomes in pure blue color.
11. When either of the above is not clear enough, repeat the adjustments of steps 7 to 12.

Note: The landing adjustments of steps 8 and 9 can accuratelybe made by using the beam landing adjustment jig.

[FOCUS ADJUSTMENT]

1. Receive the inverse double crosshatch signal (black in white base) with the internal signal.
2. Adjust with FOCUS VR so that the center of the screen becomes the best focus point.



[CONVERGENCE ADJUSTMENT]

Preparation; Set the selection switch SW to HDTV-A mode.

1. Input the crosshatch signal (Internal or external signal)

Note: Take note that there is a possibility that the picture of the internal SG differs in the picture phase from that of the external SG.
It can be matched with H PHASE of the sub control panel (D board).

2. Turn ON (⊏) the CONTRAST MANUAL SW on the front panel and adjust with the CONTRAST MANUAL VR so that the crosshatch can be seen with ease.
3. Be sure to confirm that it becomes into a stabilized state after flowing current for over 30 minutes.
4. Reset the digital convergence data of the HDTV-A.
5. Reset the digital convergence data of the normal scan.
6. Press the [MODE] key.

```
CONVER  HDTV-A
COARSE  NO.##  RGB
```

is displayed.

7. Press simultaneously continuously the OPERATE keys [<] and [>] for over 1 second.
It has been completed when

```
   RESET
     COMPLETE
```

is displayed.

8. Reset the FINE data of the convergence.
Press the [MODE] , [FORWARD] and [CURSOR/DATA] keys.

```
CONVER  HDTV-A
 FINE   DATA   RGB
```

is displayed.

9. Press simultaneously and continuously the OPERATE keys [<] and [>] for over 1 second.

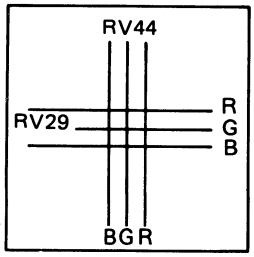
```
   RESET
     COMPLETE
```

is displayed.

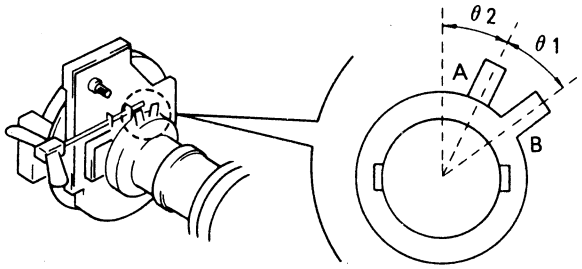
- **Static convergence adjustment (Place the set eastward)**

Note: Since steps 1 to 4 have previously been adjusted, it is unnecessary to adjust other than when replacing the DY.

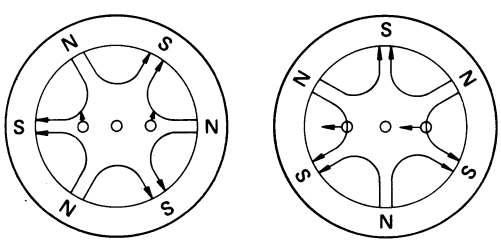
1. Adjust by turning the center VR (RV29 and RV44) of the V and H convergences of the sub control panel (D board) so that the 3 colors of red, green, and blue become into parallel lines at the center.



2. At this point, when the color deviation in horizontal direction is small, turn the H.STAT VR within the HV block.
3. Turn the 6-pole magnet ring positioned at the rear of the DY and adjust so that the distance between the red and green and that of blue and green of the 3 colors parallel lines become equivalent. (Alter $\theta 1$ and $\theta 2$.)



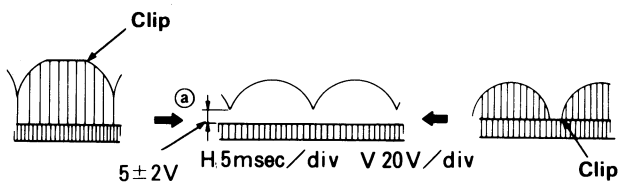
Note: Movement of the correction due to 6-pole magnet ring Generate the magnetic flux of the equivalent amount and equivalent direction against the side beams (blue and red) and change the correction amount by varying the opening angle of the 2 sheets of the magnets and change the correction direction by turning simultaneously the 2 sheets of the magnets to converge the side beams.



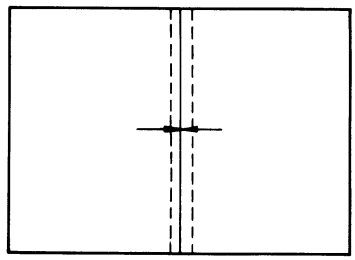
Correction due to 6-pole magnet ring

4. Perform rough adjustment of the convergence with the VR on the sub control panel (D board).
5. Connect probe to the positive pole of C35 on the E board. The parabolic DC level of the V period of a changes when turning the center VR (RV44) of the H convergence on the sub control panel (D board).
   Adjust RV44 so that the upper and lower points of the DC level are not clipped.

Note: Be sure to perform this adjustment when the movement of RV44 is not smooth.



6. Match the horizontal misconvergence at side of the center of the screen by turning the H STAT VR of the HV block.



7. Make painted lock of the H STAT VR.

- **Dynamic Convergence (Analog section) Adjustment**

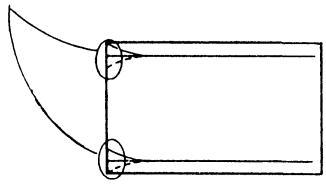
1. Adjust with the convergence VRs on the sub control panel (D board).
2. Each VR corresponds to a screen portion.
3. Red and blue symmetrically moves against green for the adjustment. (Green does not move.)
4. Make the adjustment in the order from the center, Y axis, X axis and to the corners on the screen.

- V-Convergence Phase Adjustment (Normally unnecessary because this adjustment has already been made at the time of shipment.)
  Connect a probe to the Q81 collector on the D board and set the pulse width at 1.5 ± 0.05 μsec by turning RV75 (V-CONV PHASE).
- V-Sub Convergence Adjustment (Normally unnecessary because this adjustment has already been made at the time of shipment.)

1. Select the HDTV A mode and reset the digital convergence (both COARSE and FINE). (Refer to P4-7)
2. Turn RV78 (V SUB CONV) counterclockwise fully.
3. Set volume RV22 through RV36 to the mechanical center and closely match the H convergence with RV36 through RV51.
4. Match with RV27 through RV31 (V convergence in the center).

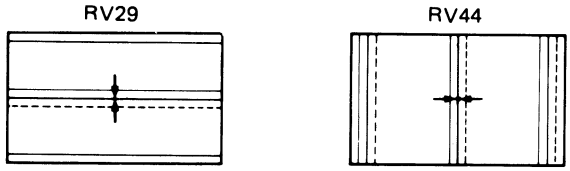
5. Turn RV22 clockwise fully and RV26 counterclockwise fully.
6. Turn RV78 clockwise so that respective R.G.Bs become almost parallel on the left edge.
7. Here, make an analog convergence adjustment again.

Match the R.G.Bs so that they become almost horizontal.



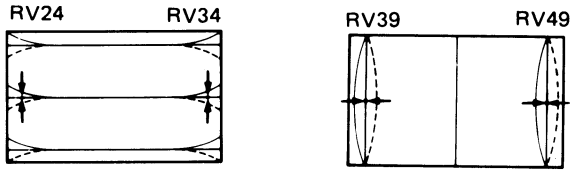
• Convergence Adjustment Procedure

1. Input the cross-hatch signal and select the HDTV A mode.
2. Reset the digital convergence data.
3. Set the CONTRAST MANUAL SW and BRIGHTNESS MANUAL SW on the front panel to ON (⊓), respectively, and turn the corresponding VRs to the appropriate position for easy observation.
4. Match RGB of the screen center with RV29 and RV44.

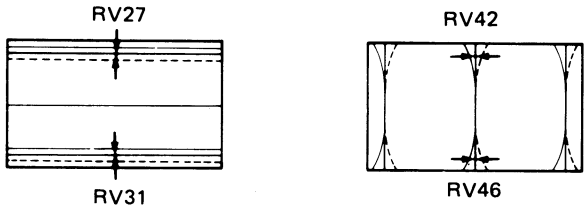


5. Match the respective RGBs of the screen the left and the right (on X axis) from the center with RV24, RV34, RV39 and RV49.

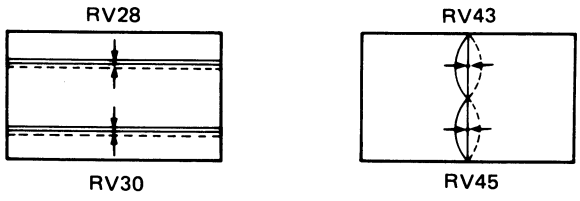
Note: Match first with RV34 and RV49 (on the right side).



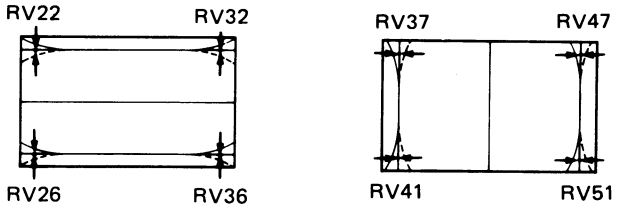
6. Match the respective RGBs of the screen upper and the lower (on Y axis) from the center with RV27, RV31, RV42 and RV46.



7. Match the respective RGBs of the screen upper middle section and the lower middle section from the center with RV28, RV30, RV43 and RV45.

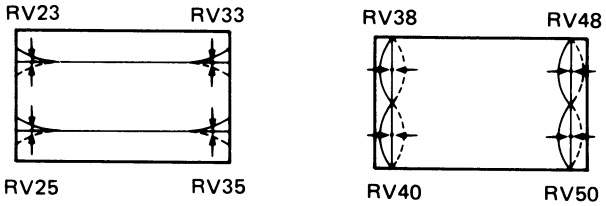


8. Match the respective RGBs of the screen corners with RV22, RV26, RV32, RV36 and RV37, RV41, RV47, RV51.



Note: Match first with RV32, RV36, RV47 and RV51 (on the right side).

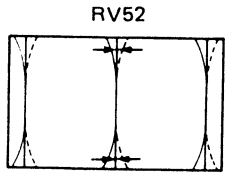
9. Match the convergences of the screen middle upper left and right and the middle lower left and right with RV23, RV25, RV33, RV35 and RV38, RV40, RV48, RV50.



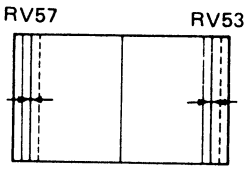
Note: Match first with RV33, RV35, RV48 and RV50 (on the right side).

10. If the convergence is not correct at this time yet, perform the adjustment again from step 4 above.
11. Select the UNDER SCAN mode.
12. Reset the digital convergence data.
13. Match RGB of the screen center upper and the lower with RV52.

    The upper and lower sections move at the same time.



14. Match RGB of the screen center left and right with RV53 and RV57.



• Digital Convergence Adjustment

Confirm that the mode is set to HDTV A, and then adjust the convergence with the control unit (N board). See Section 1 "OPERATION FOR ADJUSTMENT PROCEDURES".

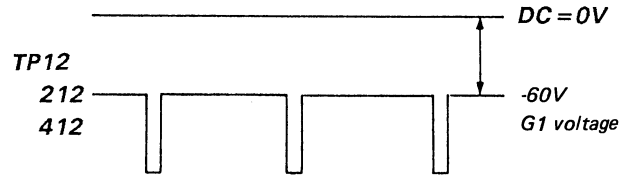
Resetting and adjusting of the digital convergence are also necessary for the HDTV B and 525PROG.

For the 525PR, first make this adjustment before you make the digital convergence adjustment. After adjusting the screen size, reset the digital convergence and match the H AMP of PROG with RV71.

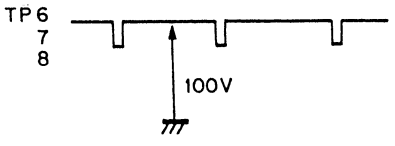
[G2 ADJUSTMENT]

1. Set SW and VR as follows.
   Front Panel
   INPUT SELECTION SWITCH ..... A CH
   CONTRAST MANUAL SW ..... Preset
   BRIGHT MANUAL SW ..... Preset
   Inside of Drawer
   PRESET CONTRAST VR..... Mechanical Center

2. Reset the PRESET data for color temperature.
   Select the PRESET with the color temperature selection mode and then reset the data with the color temperature adjustment mode and the system selection switch corresponding to INPUT A on the JA board. See the following description of transfer procedures part I for color temperature adjustment modes, part II for data selection method for the color temperature selection mode, and part III for resetting procedures.
3. Reset color temperature data for each MANUAL (HD-A), MANUAL (HD-B) and MANUAL (525PR).
   1) Select MANUAL with the color temperature selection mode and then set the color temperature adjustment mode.
   2) Select the 525PR with the system selection switch on the JA board, then reset the data.
   3) Select the HD-B with the system selection switch on the JA board, then reset the data.
   4) Select the HD-A with the system selection switch on the JA board, then reset the data.
4. Using VR and TP on the CA board, adjust the G1 voltage of each R, G and B at −60V.
   R . . . . TP12, RV2 (R-BIAS 1)
   G . . . . TP212, RV202 (G-BIAS 1)
   B . . . . TP412, RV402 (B-BIAS 1)



5. Using VR on the CA board and TP on the CB board, adjust the pedestal level of cathode for each R, G and B at +100V.
   R . . . . TP6 (KR), RV1
   G . . . . TP7 (KG), RV2
   B . . . . TP8 (KB), RV3

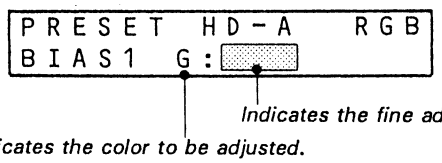


6. Adjust the G2 (SCREEN) VR so that one of the most luminous colors of R, G and B, becomes slightly more luminous than the reset.
7. Paint lock the G2 (SCREEN) VR.

[COLOR TEMPERATURE (PRESET DATA) ADJUSTMENT]

1. Be sure to perform the G2 adjustment before performing the color temperature adjustment. Set SW and VR the same as in the G2 adjustment.
2. Select PRESET as the color temperature selection mode, then set the color temperature adjustment mode. Set the system selection switch on the JA board to the HD-A.
3. Reset the PRESET data.
4. Using the color analyzer, adjust the PRESET data at 6500°K as follows.

4.1. BIAS 1 ADJUSTMENT



Adjust as follows using RV on the CA board and the key of control unit.

Color Temperature 6500K
Luminance 0.5nit

Coarse adjustment

R Adjustment	RV2 on CA board
G adjustment	RV202 on CA board
B Adjustment	RV402 on CA board

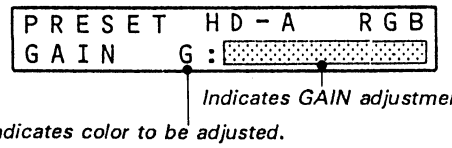
Fine adjustment

R Adjustment	After pressing the RED COLOR SELECT key, press the OPERATE keys < and > .
G Adjustment	After pressing the GREEN COLOR SELECT key, press the OPERATE keys < and > .
B Adjustment	After pressing the BLUE COLOR SELECT key, press the OPERATE keys < and > .

When the OPERATE key < is pressed, the screen gets darker. When > is pressed, the screen gets brighter. Adjust the brightness as much as possible using the coarse VR control.

4.2. GAIN ADJUSTMENT

Press the FORWARD FUNCTION key to obtain the following display.



Adjust as follows using the control unit.

Color Temperature 6500K
Luminance 60nit

R Adjustment	After pressing the [RED] COLOR SELECT key, press the OPERATE keys [<] and [>].
G Adjustment	After pressing the [GREEN] COLOR SELECT key, press the OPERATE keys [<] and [>].
B Adjustment	After pressing the [BLUE] COLOR SELECT key, press the OPERATE keys [<] and [>].

4.3. Press the [BACK] FUNCTION key to set to the BIAS 1 adjustment mode, and re-adjust the color temperature of the black level.
Repeat steps 4.2 and 4.3 until a optimum color temperature is obtained.

4.4. BIAS 2 Adjustment
Press the [FORWARD] FUNCTION key to obtain the following display.

Indicates adjustment value.

Indicates color to be adjusted.

(Set by pressing the COLOR SELECT keys [RED], [GREEN], or [BLUE].)

Adjust as follows using the control unit on the CA board:

Color Temperature 6500K
Luminance 0.5nit

Use the following keys for adjustments.

R Adjustment	After pressing the [RED] COLOR SELECT key, press the OPERATE keys [<] and [>].
G Adjustment	After pressing the [GREEN] COLOR SELECT key, press the OPERATE keys [<] and [>].
B Adjustment	After pressing the [BLUE] COLOR SELECT key, press the OPERATE keys [<] and [>].

4.5. Press the [BACK] FUNCTION key to set to the GAIN adjustment mode and re-adjust the color temperature of the white level. Repeat the steps 4.5 and 4.6 until a optimum color temperature is obtained.

4.6. Press the [MODE] key to release the color temperature adjustment mode.

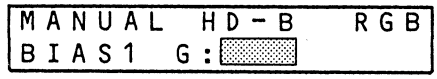
[COLOR TEMPERATURE (MANUAL HD-A DATA) ADJUSTMENT]

1. Adjust the color temperature (PRESET data) to bring the PRESET data for 6500K, and then perform the following adjustments.
2. Select MANUAL as the color temperature selection mode and then set the color temperature adjustment mode.
   Set the system selection switch on the JA board to the HD-A.
3. Reset the MANUAL (HD-A) data.
   By doing this, the PRESET data is transferred to the MANUAL (HD-A).
4. Press the MODE key to release the color temperature adjustment mode.

[COLOR TEMPERATURE (MANUAL 525PR DATA) ADJUSTMENT]

1. Select MANUAL as the color temperature selection mode and then set the color temperature adjustment mode.
   Set the system selection switch on the JA board to the HD-B.
2. Reset the MANUAL (HD-B) data.
3. Adjust the MANUAL (HD-B) data with the color analyzer and set the color temperature at 9300K as follows.

3.1. BIAS 1 ADJUSTMENT



Adjustment as follows using the control unit.

Color Temperature 9300K
Luminance 0.5nit

R Adjustment	After pressing the [RED] COLOR SELECT key, press the OPERATE keys [<] and [>].
G Adjustment	After pressing the [GREEN] COLOR SELECT key, press the OPERATE keys [<] and [>].
B Adjustment	After pressing the [BLUE] COLOR SELECT key, press the OPERATE keys [<] and [>].

3.2. GAIN ADJUSTMENT
Press the [FORWARD] FUNCTION key to obtain the following display.

```
MANUAL  HD-B    RGB
GAIN    G:▒▒▒▒
```

Adjust as follows using the control unit.
Color Temperature 9300K
Luminance 60nit

R Adjustment	After pressing the [RED] COLOR SELECT key, press the OPERATE keys [<] and [>].
G Adjustment	After pressing the [GREEN] COLOR SELECT key, press the OPERATE keys [<] and [>].
B Adjustment	After pressing the [BLUE] COLOR SELECT key, press the OPERATE keys [<] and [>].

3.3. Press the [BACK] FUNCTION key to select the BIAS 1 adjustment mode, then re-adjust the color temperature of the black level.
Repeat the steps 3.2 and 3.3 until the optimum color temperature is obtained.

3.4. BIAS 2 Adjustment
Press the [FORWARD] FUNCTION key to obtain the following display.

```
MANUAL  HD-B    RGB
BIAS2   G:▒▒▒▒
```

Adjust as follows using the control unit.
Color Temperature 9300K
Luminance 0.5nit

R Adjustment	After pressing the [RED] COLOR SELECT key, press the OPERATE keys [<] and [>].
G Adjustment	After pressing the [GREEN] COLOR SELECT key, press the OPERATE keys [<] and [>].
B Adjustment	After pressing the [BLUE] COLOR SELECT key, press the OPERATE keys [<] and [>].

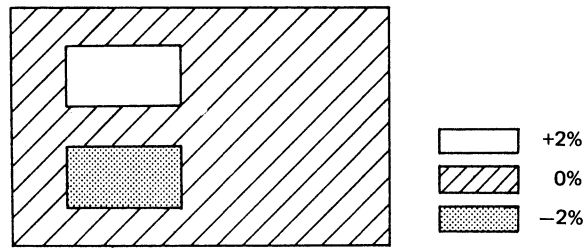
3.5. Press the [BACK] FUNCTION key to select the GAIN adjustment mode, then re-adjust the color temperature of the white level.
Repeat steps 3.4 and 3.5 until the optimum color temperature is obtained.

3.6. Press the MODE key to release the color temperature adjustment mode.

4. Select MANUAL as the color temperature selection mode, then set to the color temperature adjustment mode.
Set system selection switch on the JA board to 525PR.
5. Copy the MANUAL (HD-B) data on the MANUAL (525PR). (See the following description, part III for copying method.)

[COLOR TEMPERATURE (MANUAL HD-B DATA) ADJUSTMENT]
The adjustment procedure is same as for MANUAL (HD-A), except that the system selection switch on the JA board is changed to HD-B.

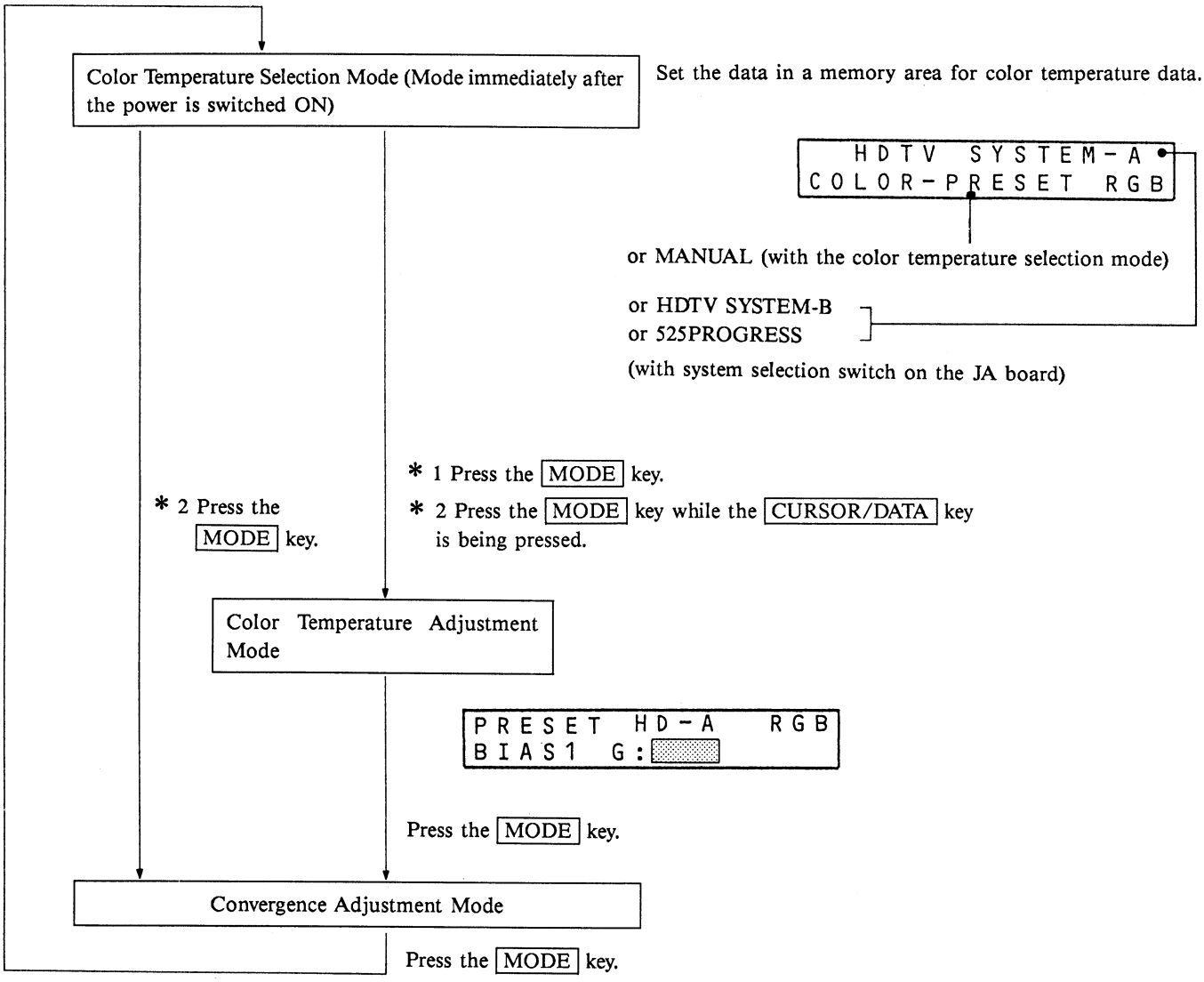
[SETTING THE PRESET BRIGHTNESS AND PRESET CONTRAST ADJUSTMENT CONTROL]
1. Change the CONTRAST MANUAL switch and the BRIGHT MANUAL switch on the front panel to the preset positions. Change the system selection switch on the JA board to HD-A.
2. Display on the screen the PLUGE internal test signal. Adjust the brightness using the PRESET BRIGHT adjustment control on the JA board, so that the −2% portion and 0% portion become indistinguishable.



3. Display on the screen the FLAT FIELD internal test signal. Adjust the contrast with the PRESET CONTRAST adjustment control on the JA board using the luminance meter, so that the luminance becomes 60nit.

I. Changeover in Adjustment Modes

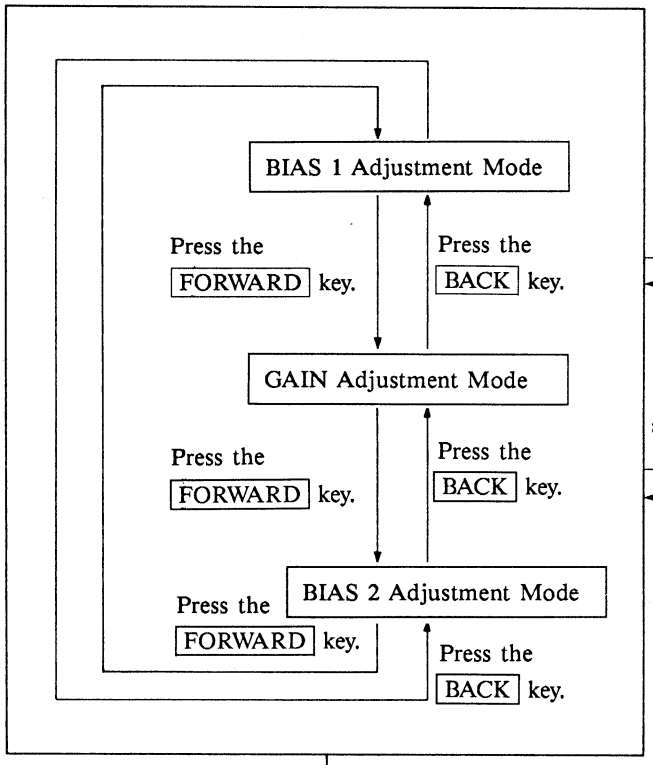
The adjustment modes are changed over with the keys on the N board as illustrated below.
For G2 adjustment and color temperature adjustment, the color temperature selection mode and the color temperature adjustment mode are used.



*1 When MANUAL is selected as the color temperature selection mode.

*2 When PRESET is selected as the color temperature selection mode.

Color Temperature Adjustment Mode



* Simultaneously press the OPERATE keys [<] and [>].

Reset Mode

Automatic Return

* Simultaneously press the OPERATE keys [Λ] and [V].

Copy Mode

* Simultaneously press the OPERATE keys [Λ] and [V].

* It is possible to change to the reset mode or the copy mode from any of the color temperature adjustment modes.

MODE key

The color temperature data in the work area are transferred to the battery backuped memory to release the color temperature adjustment data.
The BIAS 1, BIAS 2 and GAIN adjustment modes correct the data only in the work area. If the power is switched OFF without pressing the MODE key, all the corrections are erased. After adjusting the data, be sure to press the MODE key.

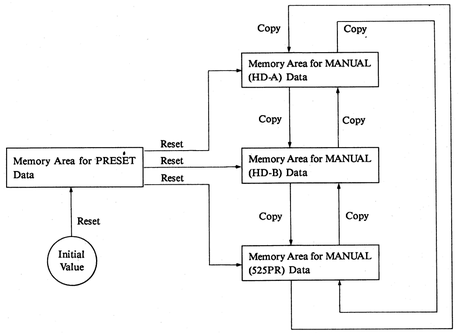
II. Selecting Method for Color Temperature Data

In this equipment, the color temperature data (BIAS 1, BIAS 2, GAIN) are stored in the memory unit.
There are four memory areas, and selection of the data in each memory area is performed by setting the system selection switch (HD-A/HD-B/525PR) on the JA board and setting the color temperature selection mode.

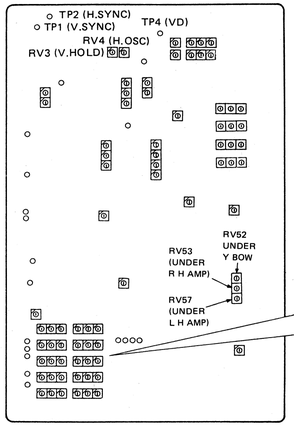
		Setting the OPERATE Keys in Color Temperature Selection Mode	
		[<]	[>]
Setting system selection switch on the JA board	HD-A	PRESET data (6500K at the time of shipment)	MANUAL (HD-A) data (6500K at the time of shipment)
	HD-B		MANUAL (HD-B) data (6500K at the time of shipment)
	525PR		MANUAL (525PR) data (9300K at the time of shipment)

It takes some time before the system changes even if system selection switch is set. This does not mean the equipment has failed.

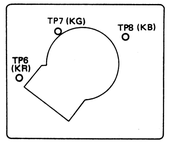
III. Resetting and Copying the Color Temperature Data It is possible to reset and copy the color temperature data in each memory area.
All the data (BIAS 1, BIAS 2 and GAIN data for R, G and B respectively) in the memory area are simultaneously reset and copied. The resetting and copying methods are referred to in "1-5-4. Resetting of Adjustment Data" and "Copying of Color Temperature" in "1-5-2. Color Temperature Adjustment".

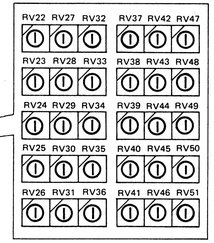


D board

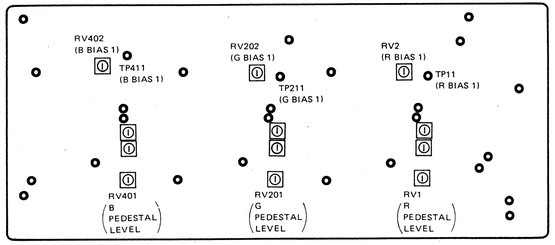


CB board

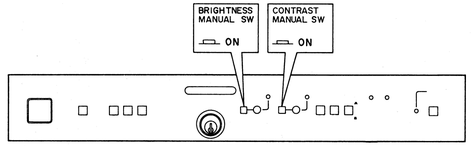




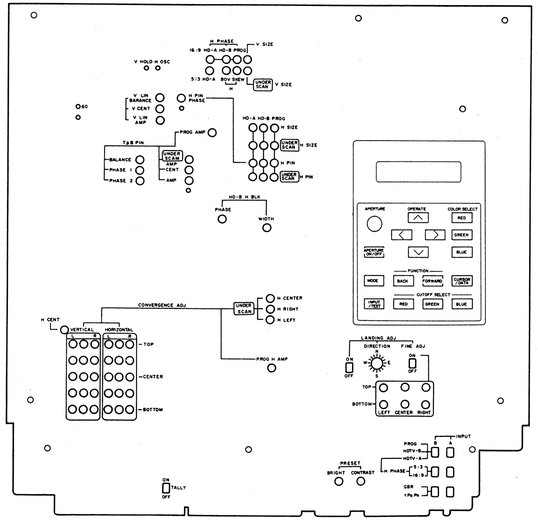
CA board



FRONT PANEL



SUB CONTROL PANEL



HIGH VOLTAGE ADJUSTMENT

High voltage adjustment is necessary when the components shown below are replaced. Use a high voltage meter for the adjustment.

High voltage blocks, D40, R114, R115, R116, R184 and RV2

1. Receive the white signal and make VR into PRESET mode.
2. Connect a high voltage meter to the anode cap.
3. Adjust RV2 (VRV) to HV=30 ±0.2 kV
4. Switch the signal between white and black and be sure the high voltage deviation is less than 0.05kV.

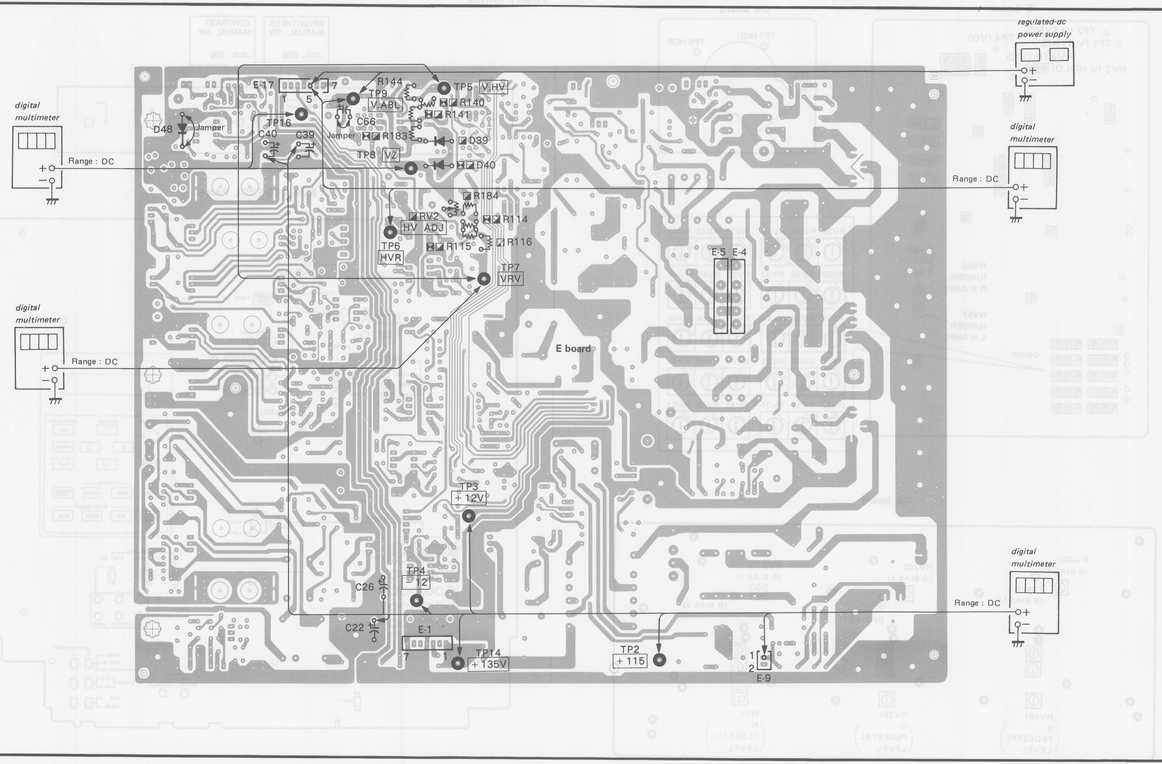
Note: If a high voltage meter is not available, adjust the TP7 (VRV) voltage to 8.40 ±0.05VDC with RV2. Switch the signal alternately and be sure there is no deviation in screen size.

CONFIRMATION OF HIGH VOLTAGE CIRCUIT COMPONENT REPLACEMENT

The specified condition must be satisfied when the following components are replaced:

E board

D40 μPC574J.HZT33-02 ★◪ R184 22k±1% ◪ R114 Adjustment resistor ★◪ R115 Adjustment resistor ★◪ R116 10k±1% ◪ RV2 2k±10% ◪ Metal grace VR	TP8: Within 32.2±1.3VDC TP7: Adjustable to 8.40 $^{+0.15}_{-0.20}$ VDC Must be less than 8.70 VDC at RV2 max.
R183 Adjustment resistor ★◪ R140 Adjustment resistor ★◪ R141 Adjustment resistor ★◪ R144 10k±1% ◪ D39 μPC574J.HZT33-02 ◪	TP5: Within 8.90 $^{+0.05}_{-0.10}$ VDC
D48 RD6.2EN ★	D48 cathode voltage: Within 6.0±0.50VDC
Power supply (TK18)	TP2: Within 115±1VDC
HV block, K board, E board	1. Operation confirmation of the high voltage regulator
D45, R145, 146, E board IC5, R142, 143	2. Confirmation of the HV protector
D44, R139, D54 IC6, E board	3. Confirmation of the Ik protector II
D43, IC5, R137, E board	4. Confirmation of the Ik protector I



CONFIRMATION OF HIGH VOLTAGE PROTECTION CIRCUIT

1. **Operation Confirmation of High Voltage Regulator**
   - HV must be 30 ±0.2 kV. (Further, switch the signal from white to black.)
   - The TP6 (HVR) voltage must be 8.40 $^{+0.09}_{-0.40}$ VDC
2. **Confirmation of High Voltage Hold-down Circuit**
   - The voltage of pin ⑤ of the connector E-17 must be 8.40 $^{+0.09}_{-0.40}$ VDC.
   - The raster should not be erased when 8.6 to 8.7 VDC is applied to pin ⑤ of the connector E-17 from the external DC power supply. The hold-down circuit should be active erasing the raster when 9.0 to 9.1 VDC is applied.
3. **Confirmation of Ik Protector Circuit I**
   - When between A and K of D48 is short-circuit and 7.9 to 8.0V is applied from the external DC power supply to TP-9 (ABL), the protector circuit operates and the raster disappears.
4. **Confirmation of Ik Protector Circuit II**
   - When the both ends of C66 is short-circuit and 4.9 to 5.0V is applied from the external DC power supply to TP-9, the protector circuit operates and the raster disappears.
5. **Confirmation of H STOP**
   1) Disconnect either connector E-4 or E-5 and turn on the power supply.
   2) Be sure that the high voltage protector operates and the raster does not appear.
6. **Confirmation of V STOP**
   1) Remove connector E-14 and set the power supply ON.
   2) Be sure that the high voltage protector operates and the raster disappears.

VOLTAGES OF RESPECTIVE SECTIONS ON E BOARD

The voltages of the respective sections must be as follows (in the white signal preset condition):

1. Pin ① of the connector E-1 (TP14 135V): 135±1VDC
2. Pin ② of the connector E-1 (TP2 115V): 115±1VDC
3. Pin ⑤ of the connector E-1 (TP3 12V): 12±0.6VDC
4. Pin ⑥ of the connector E-1 (TP4 −12V): −12±0.6VDC
5. C22 ⊕ pole: 21±1VDC
6. C26 ⊖ pole: −21±1VDC
7. C39 ⊕ pole: 33±1.5VDC
8. C40 ⊖ pole: −33±1.5VDC
9. Pin ① of the connector E-9: −131±9VDC

4-7. CIRCUIT ADJUSTMENT

CONNECTION METHOD DURING BOARD ADJUSTMENT AND SETTING OF SW

Unless otherwise specified in the following pages, the connection method and switch setting of SW must be made as follows: When only HDTV A is used, it is unnecessary to make adjustments needed for HDTV B or PR.

SETTING POSITIONS OF SWITCHES AND CONTROL KNOBS

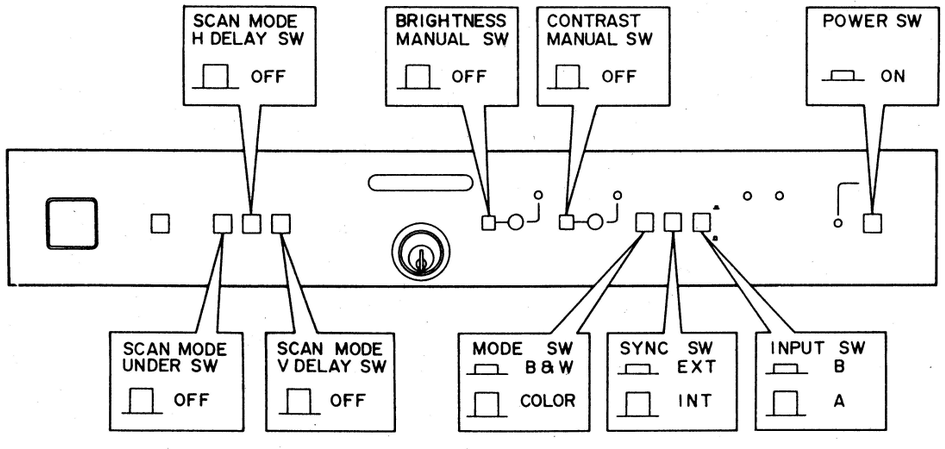
FRONT PANEL

1. INPUT switch ..... A (⊓) — JA board
2. SYNC switch ..... INT (⊓)
3. MODE switch ..... COLOR (⊓) — JA board
4. CONTRAST MANUAL switch ..... PRESET (⊓)
5. BRIGHTNESS MANUAL switch ..... PRESET (⊓) — JA board
6. SCAN MODE V DELAY switch ..... OFF (⊓) — JB board
7. SCAN MODE H DELAY switch ..... OFF (⊓) — JB board
8. SCAN MODE UNDER switch ..... OFF (⊓) — JB board

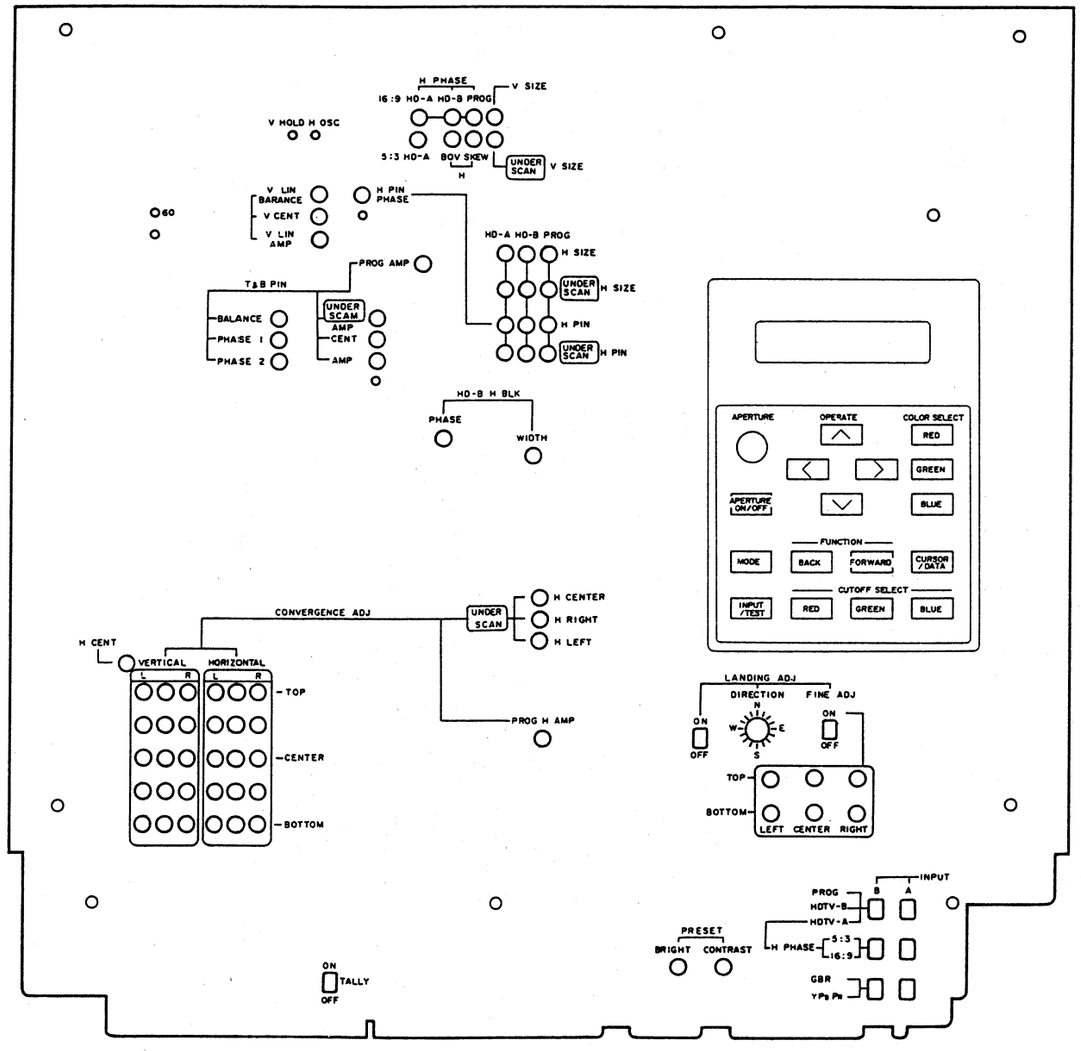
SUB CONTROL PANEL

9. Control unit ..... Initial condition — N board
   With the internal signal (at the power on time): TEST MODE
10. LANDING ADJ ON/OFF switch (SW2) ..... ON — W board
11. LANDING ADJ DIRECTION switch (SW1) ..... Match to monitor setting direction. — W board
12. LANDING FINE ADJ ON/OFF switch (SW3) ..... OFF — W board
13. INPUT A MODE SELECT switch (SW102) ..... GBR — JA board
14. INPUT B MODE SELECT switch (SW101) ..... GBR — JA board
15. INPUT A H PHASE SELECT switch (SW109) ..... 16:9 — JA board
16. INPUT B H PHASE SELECT switch (SW108) ..... 16:9 — JA board
17. INPUT A SYSTEM SELECT switch (SW113) ..... HDTV A — JA board
18. INPUT B SYSTEM SELECT switch (SW110) ..... HDTV A — JA board
19. TALLY switch (SW5) ..... OFF — JB board

FRONT PANEL

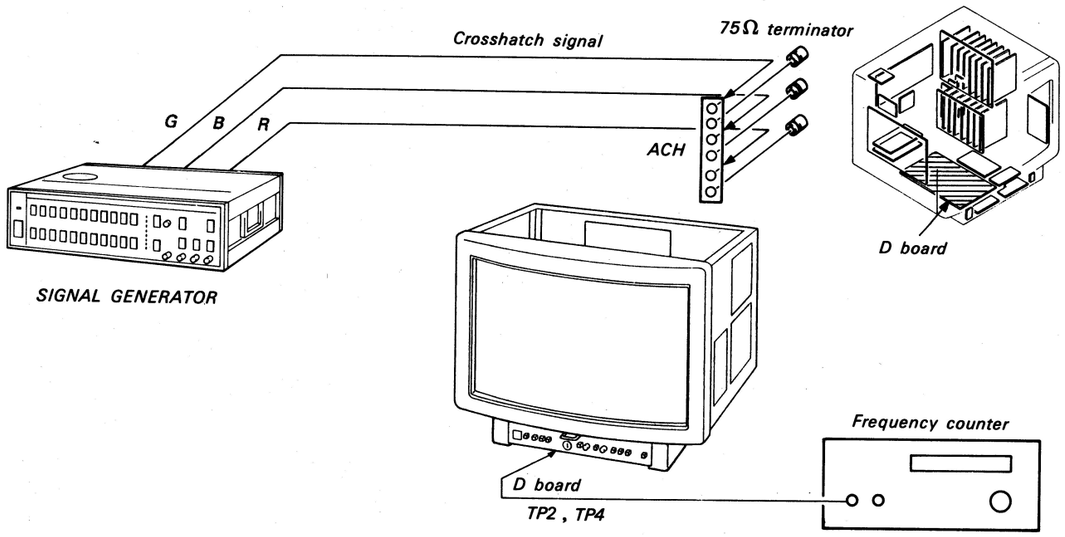


SUB CONTROL PANEL



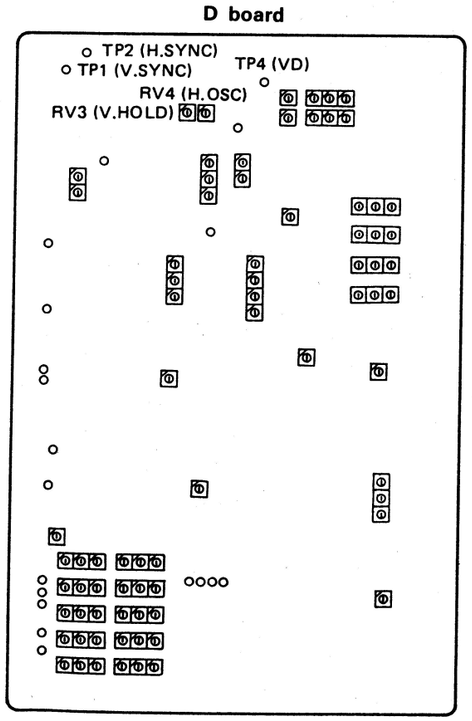
1. D AND DA, DB, E, R, W BOARDS ADJUSTMENT

D BOARD fo ADJUSTMENT

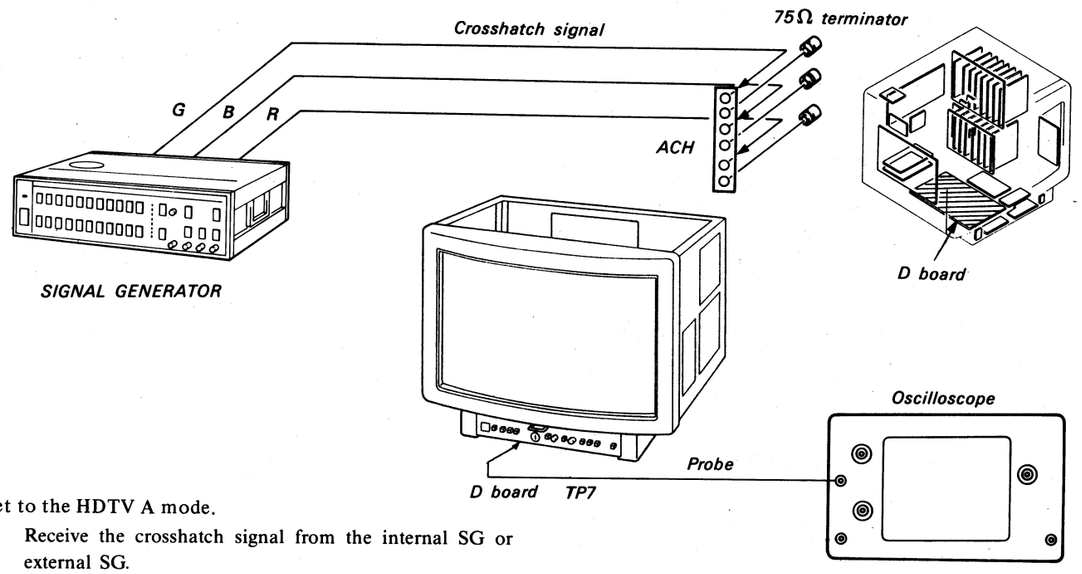


Set to the HDTV A mode.

1. Input signal from external SG.
2. Set to GND with clip the TP2 (H SYNC) of D board, and adjust with RV4 (H OSC) so that the image moving sideways stops.
3. Set to GND with clip the TP1 (V SYNC) and adjust with RV3 (V HOLD) so that the vertical frequency of the TP4 (VD) becoms 55±1.0Hz when the frequency counter is connected to TP4 (VD).



D BOARD V LAMP ADJUSTMENT

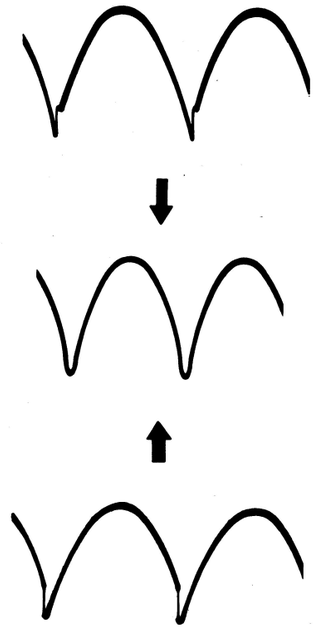


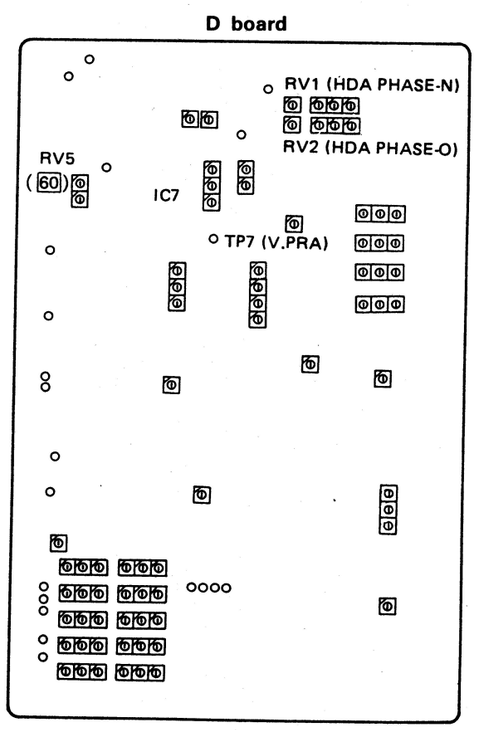
Set to the HDTV A mode.

1. Receive the crosshatch signal from the internal SG or external SG.

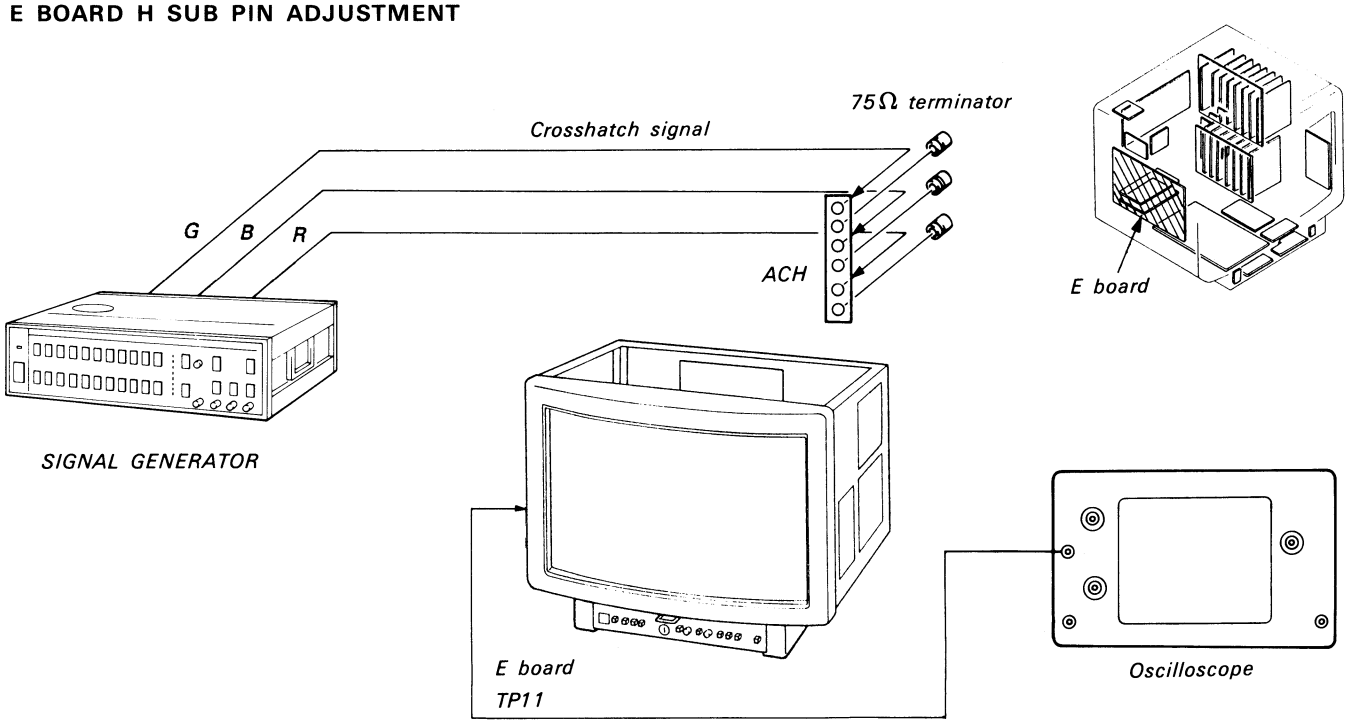
Note: The picture phase may be different from the internal SG and the receiver image. This phase difference can be matched with HDA H PHASE 16:9 (RV1) or HDA H PHASE 5:3 (setting is by SW on JA board) (RV2) on the subcontrol panel D board.

2. Connect the probe to pin ⑦ (TP7) V.PRA of IC7 of D board, and adjust the VR of [60] (RV5) to display the waveform as shown below.

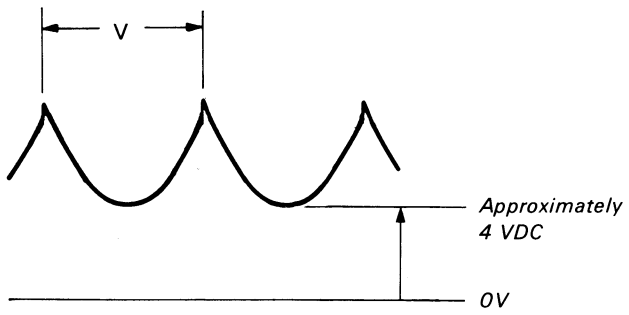


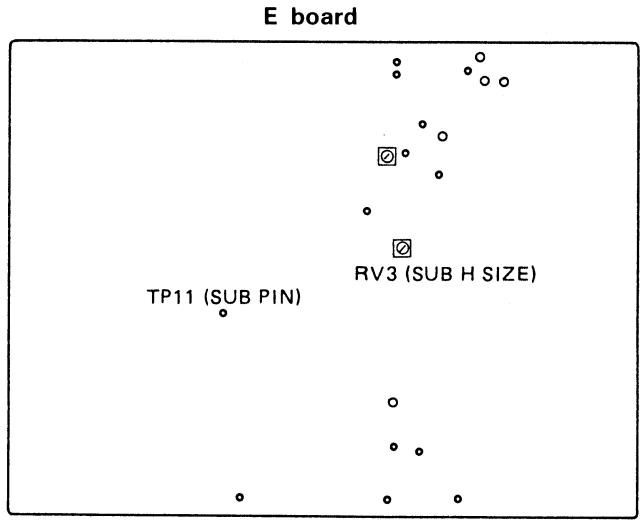


E BOARD H SUB PIN ADJUSTMENT



1. Receive a cross hatch signal (internal HDTV A signal or external signal)
2. Connect probe to TP11 (Q41 collector) on E board.
3. Adjust with RV3 (SUB H SIZE) on E board so that it becomes approximately 4.0 VDC.





D BOARD GEOMETRY CORRECTION ADJUSTMENT

- Press the BRIGHTNESS MANUAL SW. (in the lamp lit state)

1. H CENT Adjustment

1) Turn ON the BRIGHTNESS SW on the front panel and turn VR clockwise.
2) With the H SIZE VR (RV15) on the D board, minimize the horizontal size so that raster on the left and right of the screen disappears. (It is best to remove BLK. Remove the D-7 connector and lower the D75 thyristor gate on the E board to GND.)
3) Make into V DELAY MODE.
4) Turn CENT VR (RV70). Put the D-7 connector and D75 back on the E board.

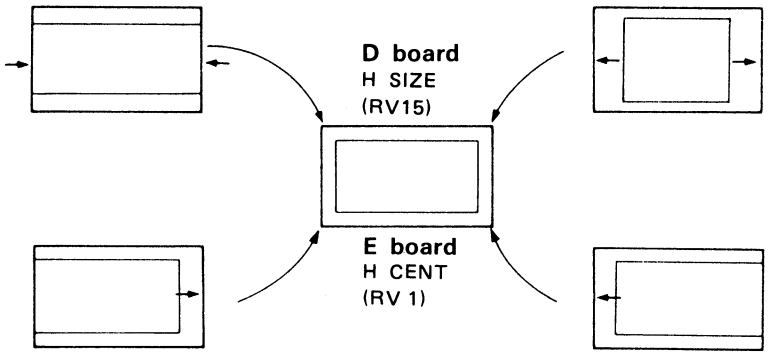
2. Picture Phase Adjustment

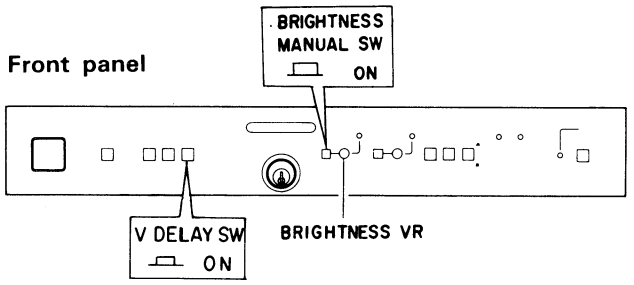
1) Set SW101 and SW102 on the JA board at HD A H PHASE 16:9.
2) Adjust RV1 (HDA H PHASE 16:9) on the D board so that the image is placed in the center of the raster.
3) Set SW101 and SW102 on the JA board at HD A H PHASE 5:3.
4) Adjust RV2 (HDA H PHASE 5:3) on the D board so that image is placed in the center of the raster.

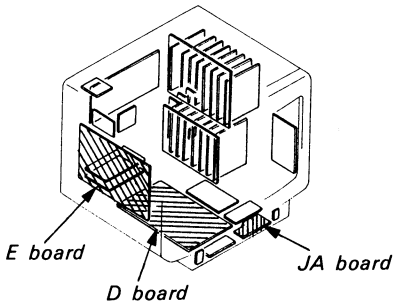
Note: Perform adjustment of the picture phase with the external input signal to be actually used.

Note: When the phase of HD, VD and EXT SYNC differs, see the HD and H. SYNC phase adjustment in page 4-44.

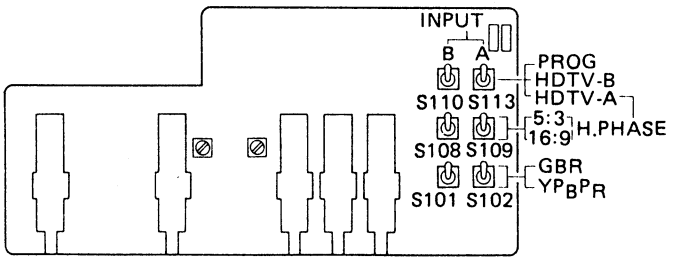
5) Select the HDTV SYSTEM B mode to feed the input signal and adjust with RV72 (HDB H PHASE) as described above.
6) Select the PR mode and adjust with RV73 (PR H PHASE) in the same way.
7) When the H size is reduced, adjust to correct size.



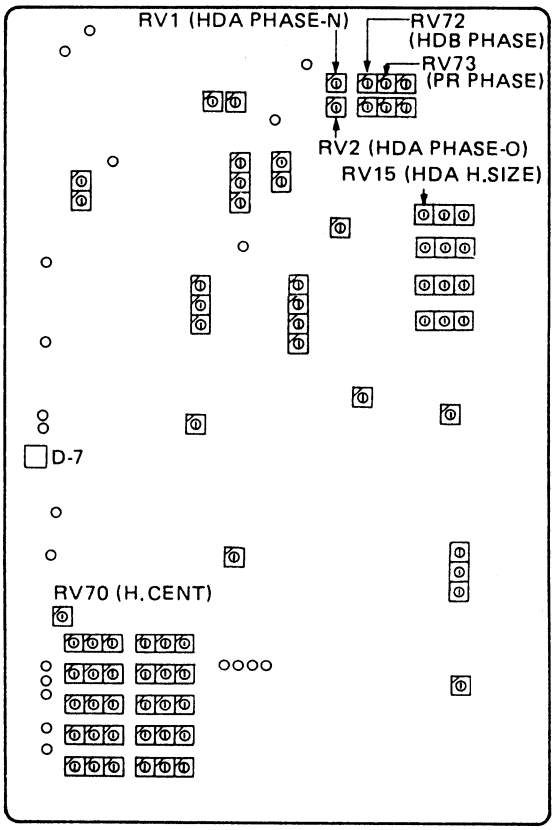




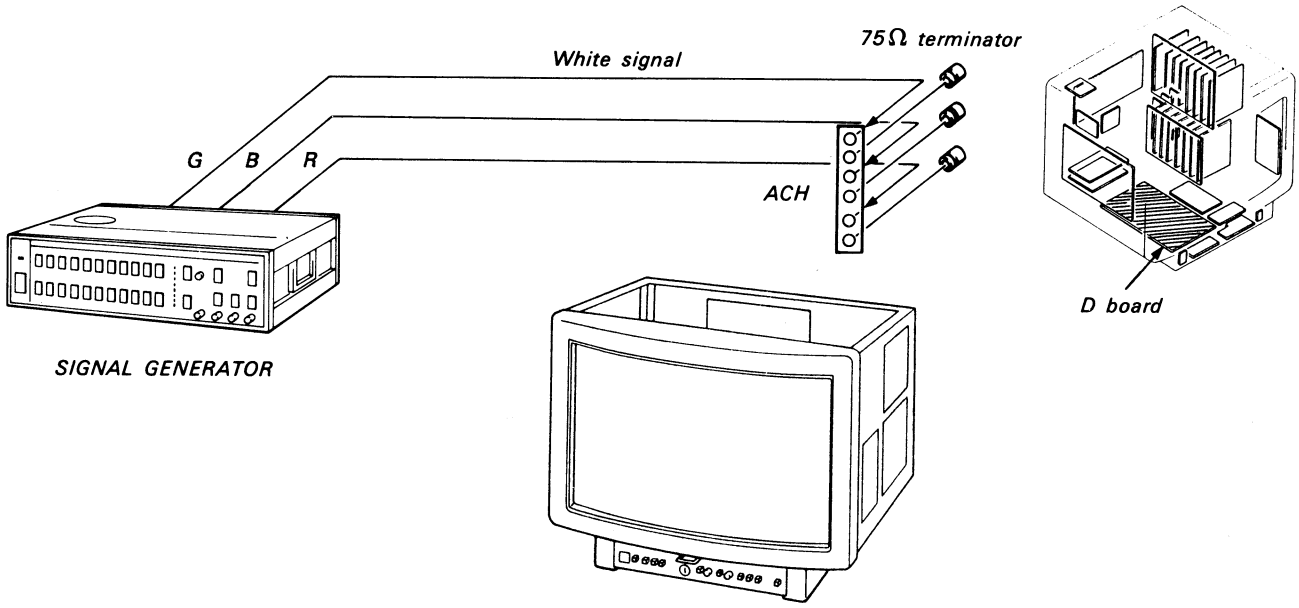
JA board



D board

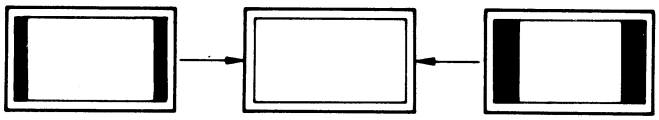


D BOARD HORIZONTAL BLANKING ADJUSTMENT



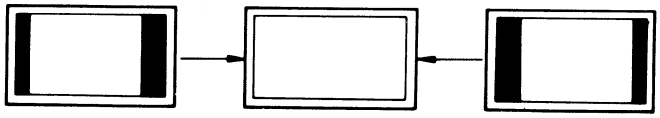
1. Receive the white signal on the picture tube. (internal or external signal)
2. Set to HDTV B. Adjust the horizontal blanking so that the picture occupies the full screen while engaging tracking of HDB H BLANKING WIDTH (RV77) with HDB H BLANKING PHASE (RV76) on the D board. Adjustment is easier with a shorter H size. Return to the original (HDB H RV16) after adjusting.

Adjust the width of the horizontal blanking.



H BLK WIDTH (RV77)

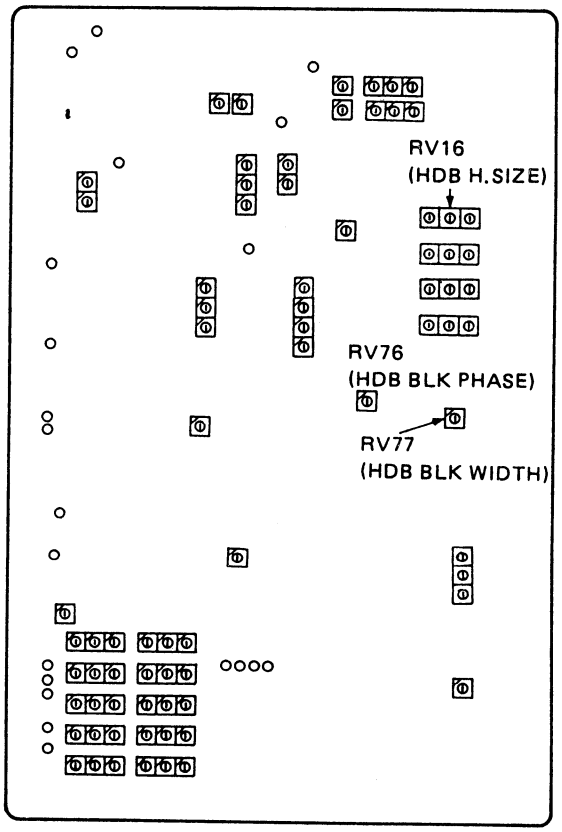
Adjust the phase of the horizontal blanking on both sides.



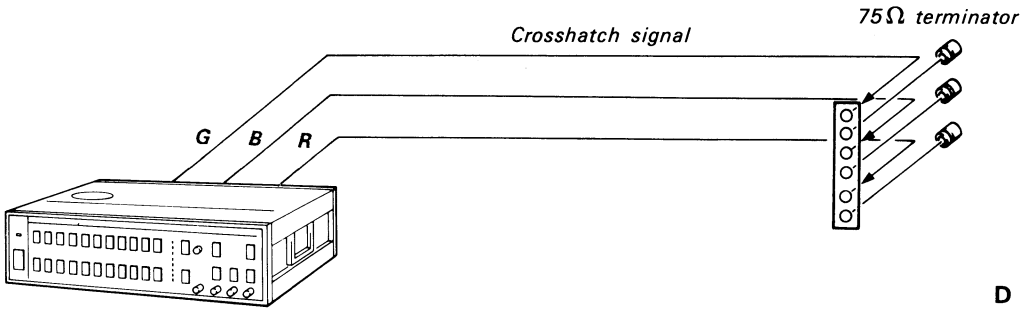
H BLK PHASE (RV76)

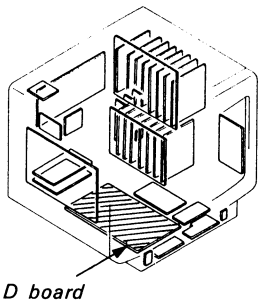
No adjustment is necessary for other systems.

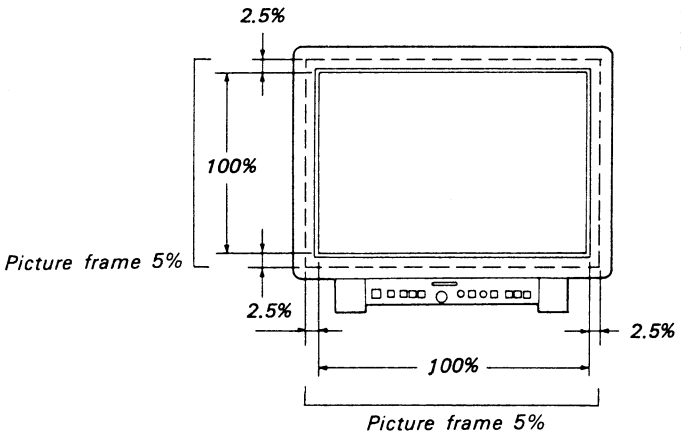
D board

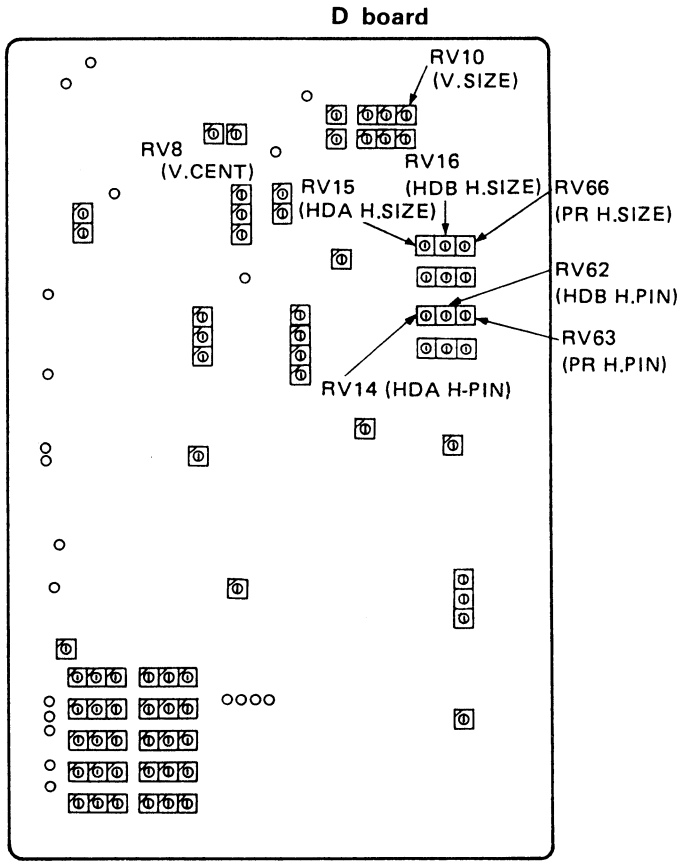


D BOARD HORIZONTAL AND VERTICAL SIZES ADJUSTMENT



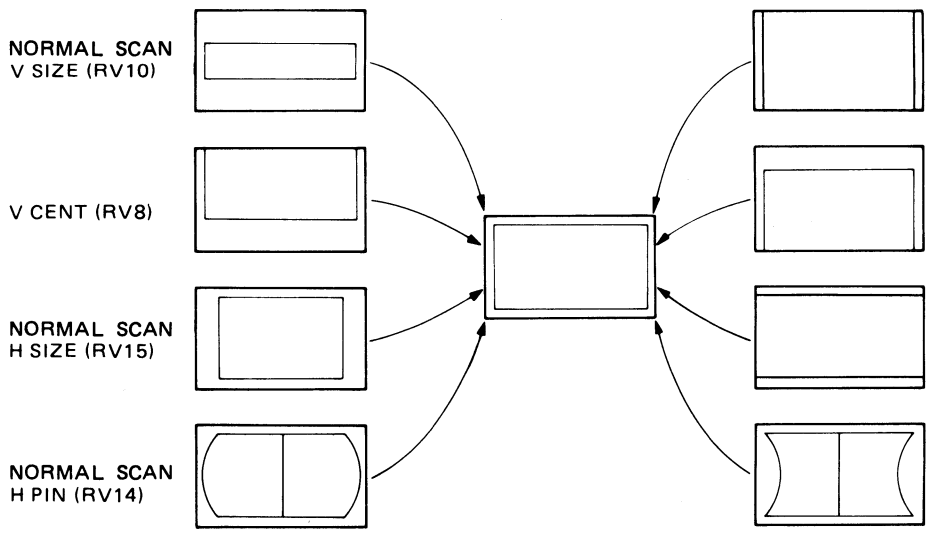




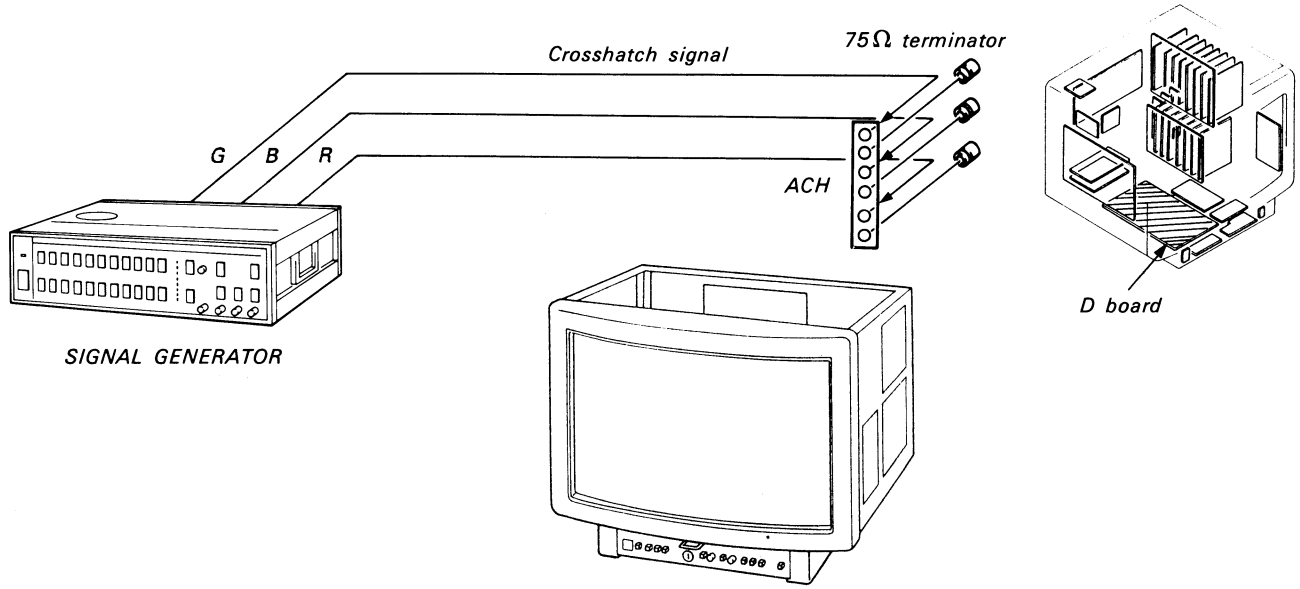


Set to the HDTV A.

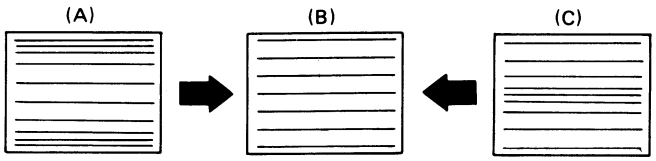
1. Input crosshatch signal (internal or external signal).
2. Shorten the V size a little with V SIZE (RV10) on the D board, and match CENTER (RV8). Return V SIZE to the original.
3. Adjust the scanning with HDA H SIZE (RV15), HDA H PIN (RV14) and V SIZE (RV10) so that it exceeds the picture frame by 5%.
4. Set to the HDTV B and perform similar adjustments with HDB H SIZE (RV16) and HDB H PIN (RV62).
5. Set to PROG. Now, adjust so that the 5% H overscanning of V has a 4:3 aspect ratio. PR H SIZE (RV66) PR H PIN (RV63).



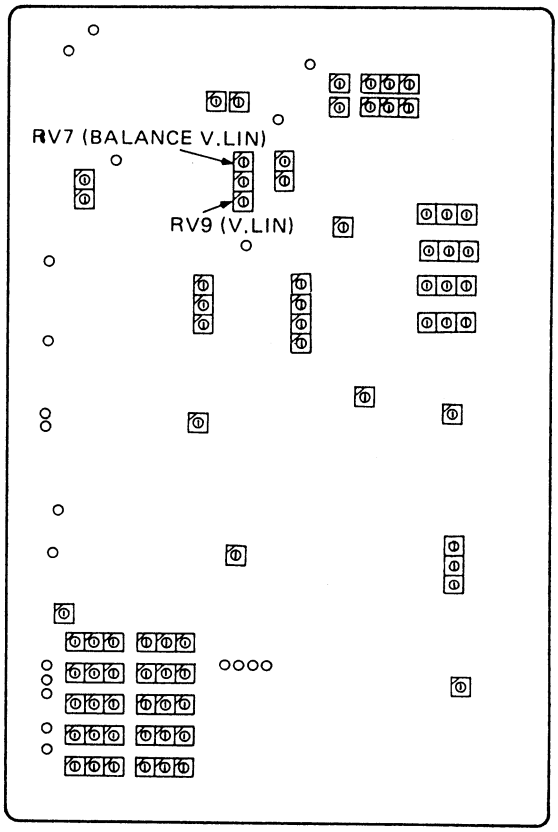
D BOARD VERTICAL LINEARITY ADJUSTMENT



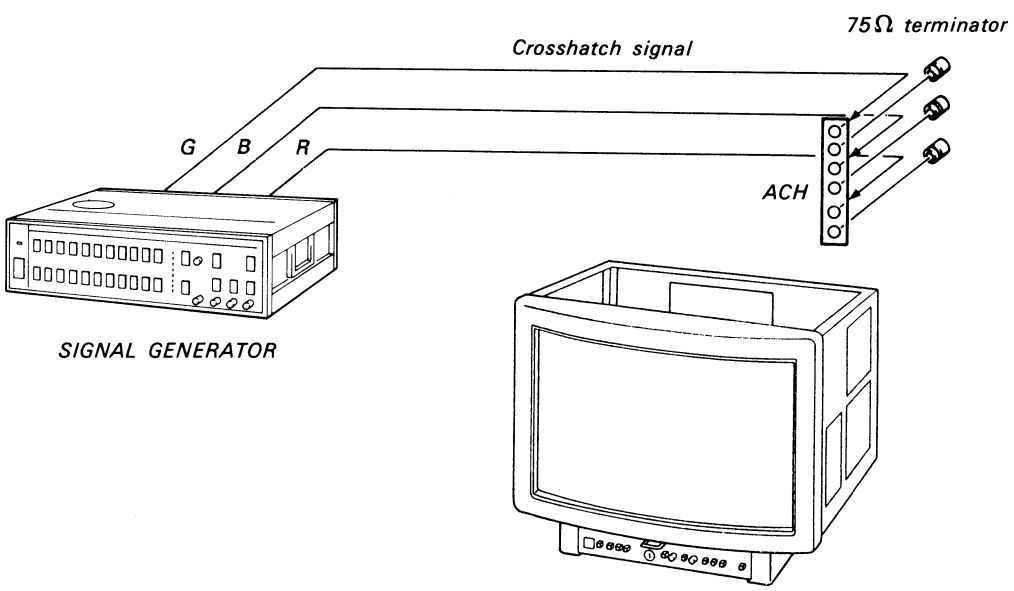
1. Input crosshatch signal (internal or external signal).
2. Turn V AMP (RV9) onthe D board fully clockwise.
3. Make the upper and lower sections become in symmetry with V LIN PHASE (RV7) (A).
4. Match the linearity so that it becomes at regular intervals overall with V LIN AMP (RV9) (A) (B) (C).

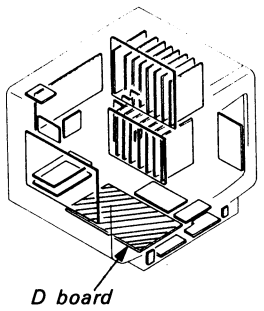


D board

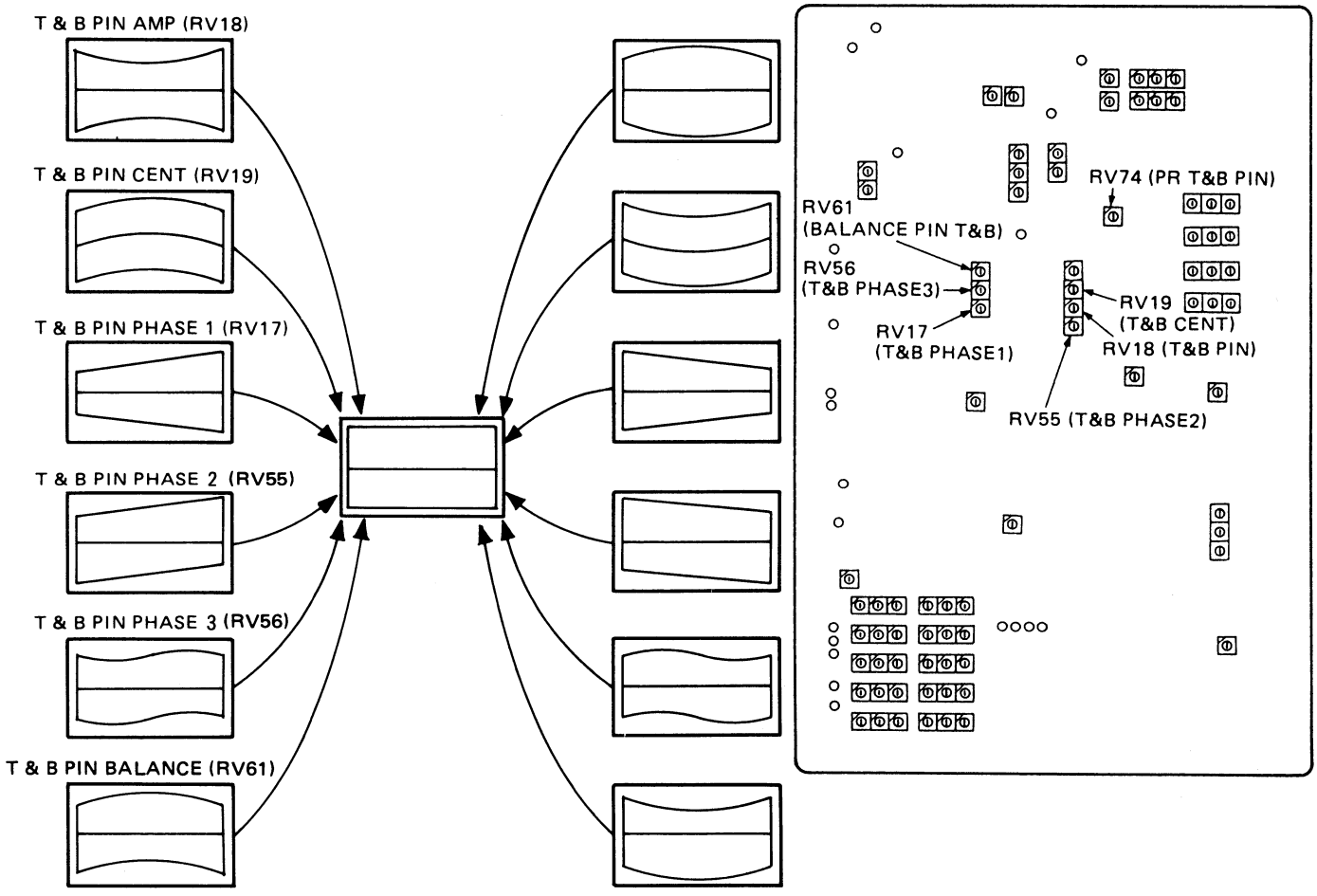


ADJUSTMENT OF TOP AND BOTTOM PINS ON THE D BOARD

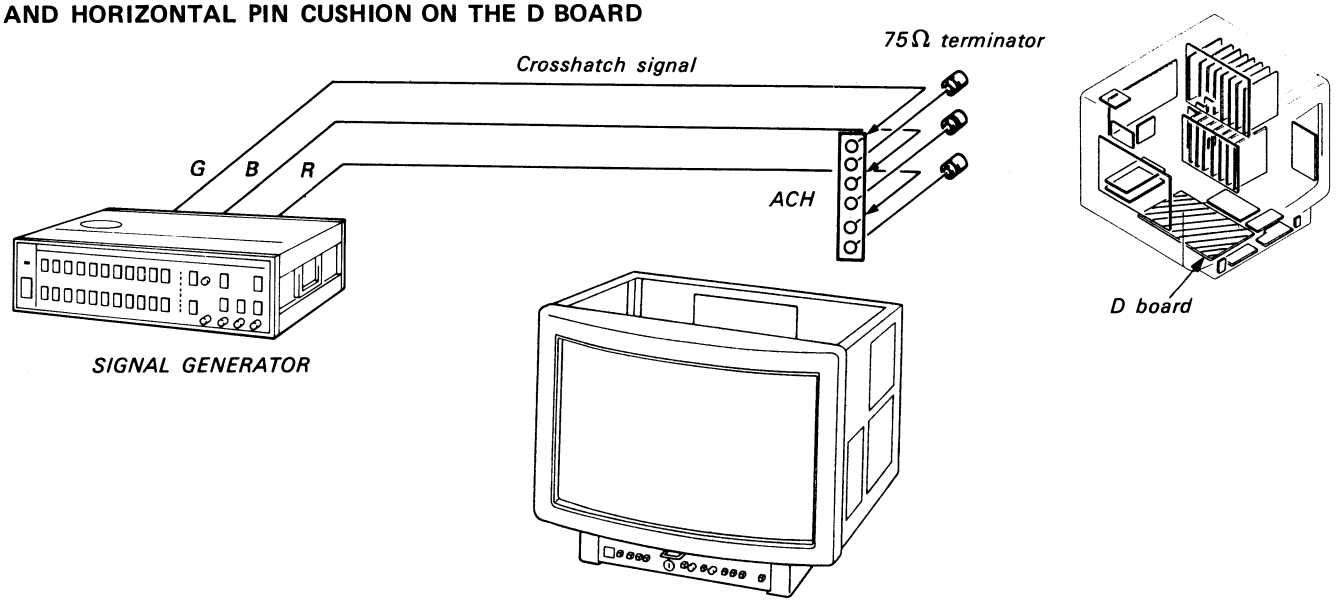




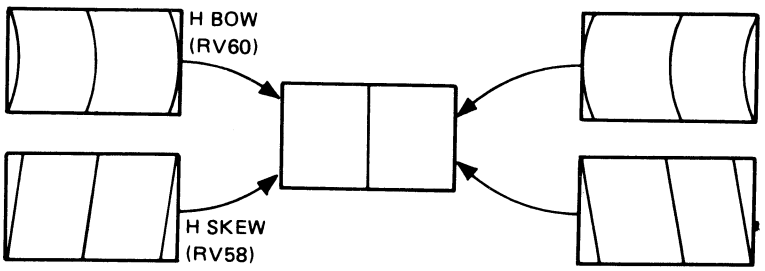
1. Input crosshatch signal (internal or external signal).
2. While engaging tracking of T & B PIN AMP (RV18), T & B PIN CENT (RV19), T & B PIN PHASE 1 (RV17), T & B PHASE 2 (RV55), T & B PIN PHASE 3 (RV56) and T & B PIN BALANCE (RV61) on the D board, match the TOP and BOTTOM pins.
3. Set to PROG and adjust the top and bottom pins with PR T&B PIN (RV74).



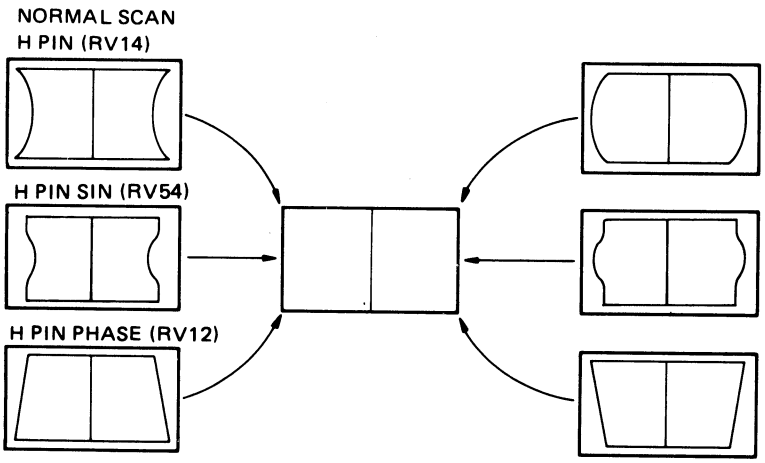
ADJUSTMENT OF DISTORTION OF Y AXIS CENTER AND HORIZONTAL PIN CUSHION ON THE D BOARD



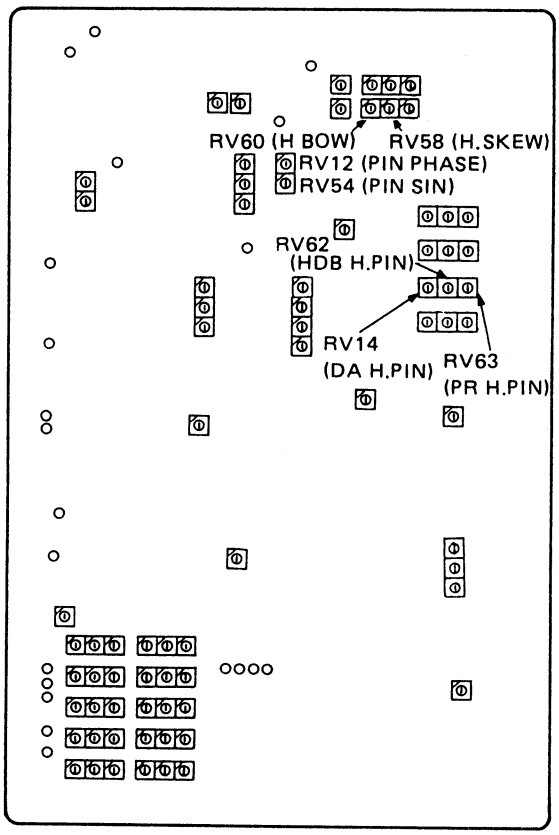
1. Input crosshatch signal (internal or external signal).
2. Adjust Y axis center with H BOW (RV60) and H SKEW (RV58) on the D board.



3. Adjust the distortion of the left and right pins with HDA H PIN (RV14), H PIN SIN (RV54) and H PIN PHASE (RV12).

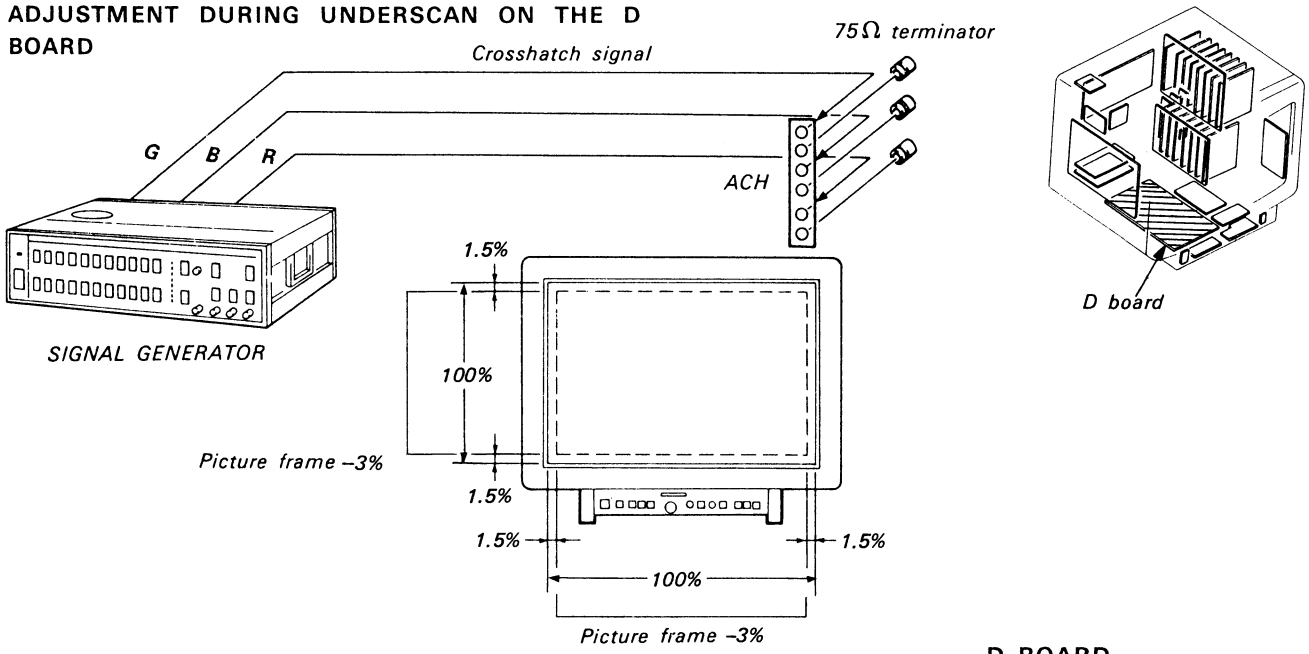


D board



4. Set to HDTV B and adjust the left and right pins with HDB H PIN (RV62).
5. Set to PROG B and adjust the left and right pins with PR H PIN (RV63).

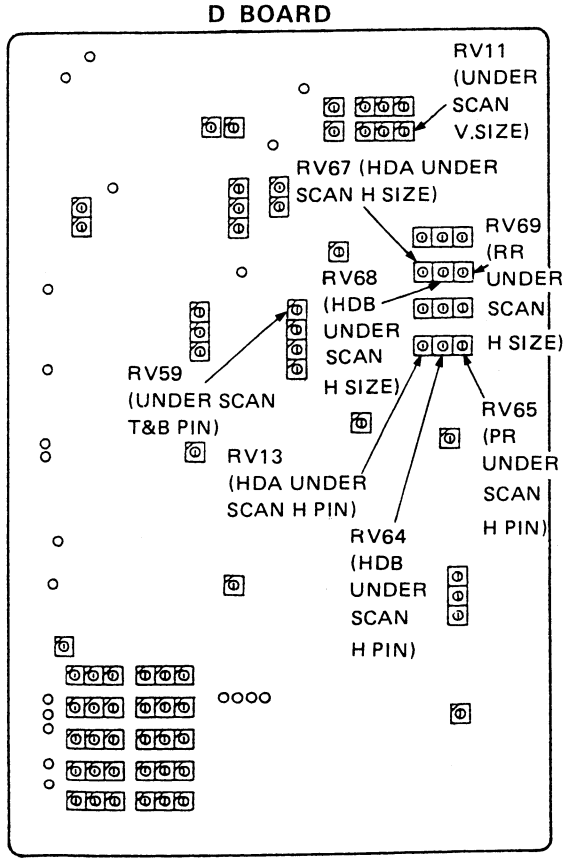
ADJUSTMENT DURING UNDERSCAN ON THE D BOARD

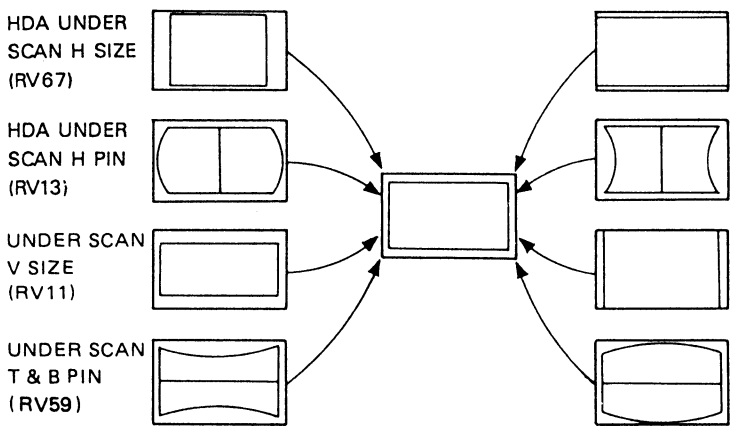


Set to the HDTV A.

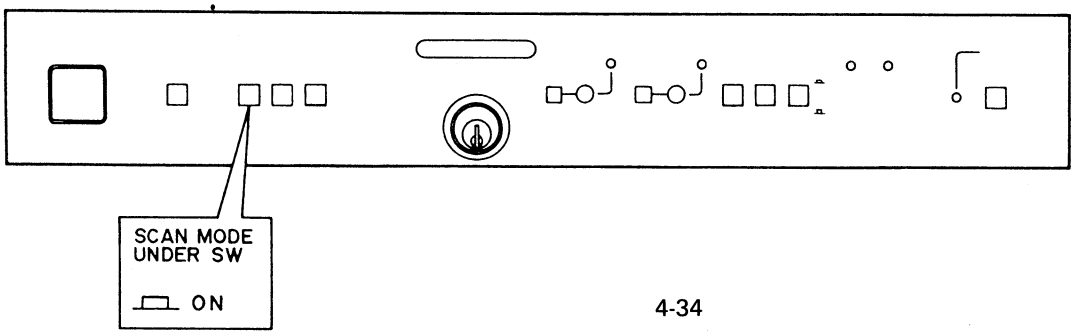
1. Input crosshatch signal (internal or external signal)
2. Turn ON the UNDER SCAN SW of the SCAN MODE SW on the front panel.
3. While engaging tracking of HDA UNDER SCAN H. SIZE (RV67). HDA UNDER SCAN H. PIN (RV13), UNDER SCAN V. SIZE (RV11) and UNDER SCAN T & B PIN (RV59). adjust so that it becomes UNDER SCAN of — 3% of picture frame.
4. Set to the HDTV SYSTEM B mode, and adjust with HDB UNDER SCAN H. SIZE (RV68) and HDB UNDER SCAN H. PIN (RV64).
5. Set to PROG mode, and adjust with PR UNDER SCAN H. SIZE (RV69) and PR UNDER SCAN H. PIN (RV65) according to the V size of this mode so that a aspect ratio becomes 4:3.

D BOARD

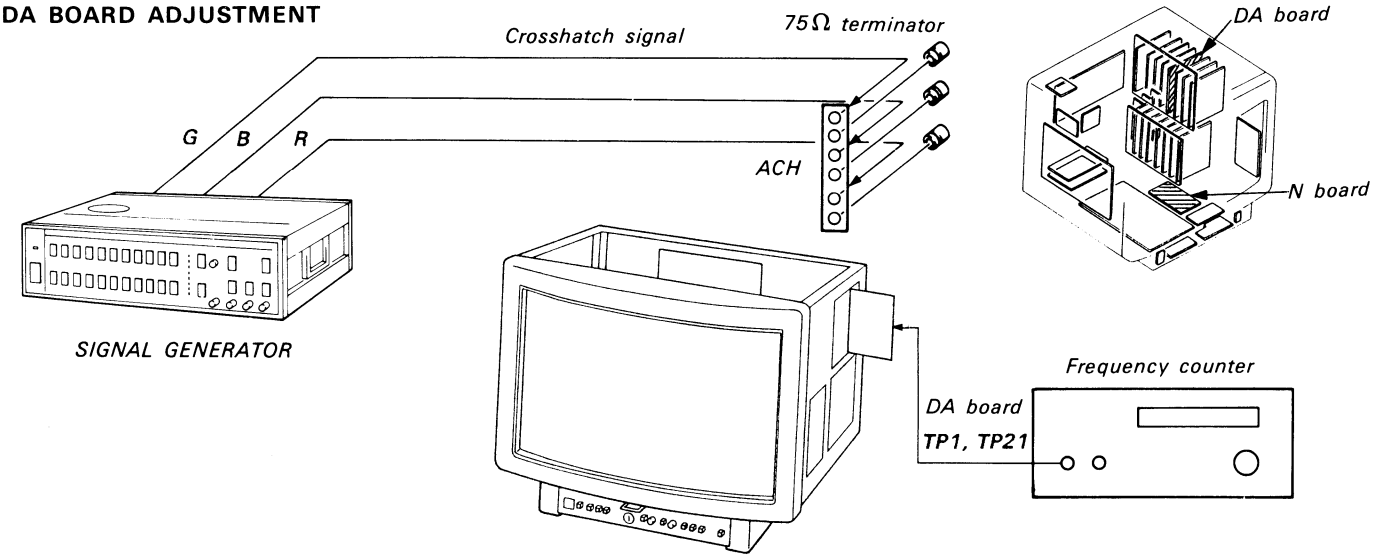




FRONT PANEL



DA BOARD ADJUSTMENT



- Input crosshatch signal (internal or external signal).

RV1 adjustment

1. Connect with clip TP21 and GND on the DA board.
2. Connect frequency counter to TP1 (VD) on the DA board and adjust with RV1 so that it becomes 48 ± 1 Hz.

RV2 adjustment

1. Match the points shown in Fig. 1 of the horizontal direction convergence.
2. Shift the convergence as shown in Fig. 2 with the respective keys of MODE, FUNCTION, OPERATE, and CURSOR/DATA of the control unit of the sub control panel.
3. When the RV2 on the DA board is turned, the position of the convergence points alters as in Ⓐ and Ⓑ of Fig. 3. Turn RV2 so that these points coincide with the upper section of the screen.

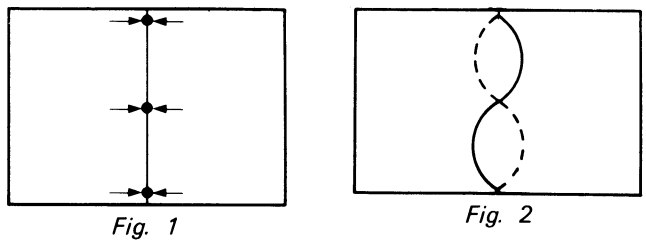


Fig. 1

Fig. 2

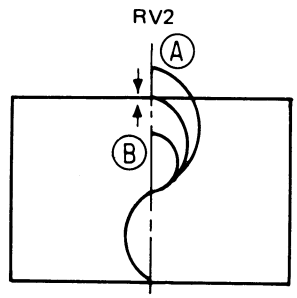
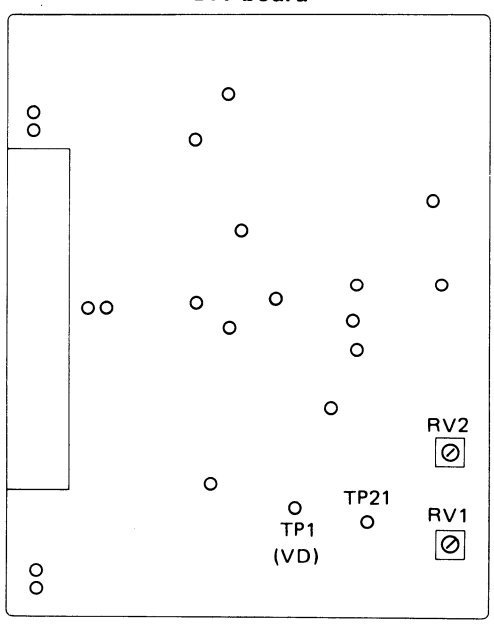
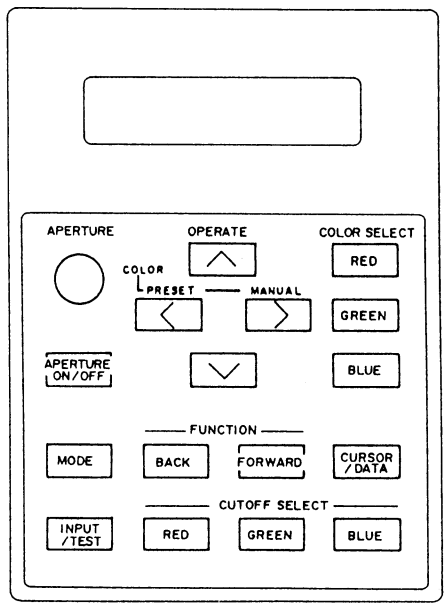


Fig. 3

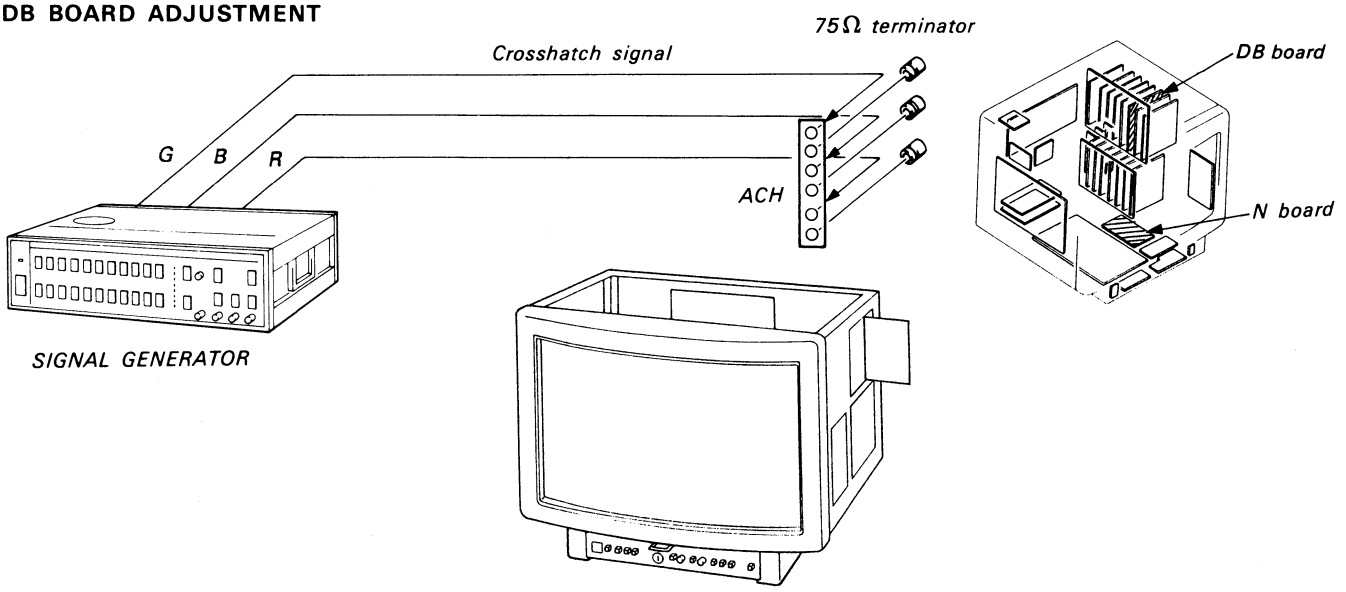
DA board



CONTROL UNIT (N board)



DB BOARD ADJUSTMENT



- Input crosshatch signal (internal or external signal).

SW4 adjustment

1. Match the points of vertical convergence as shown in Fig. 1.
2. Shift the convergence as shown in Fig. 2 with the respective keys of MODE, FUNCTION, OPERATE and CURSOR/DATA of the control unit of the sub control panel.
3. With the setting of the dip switch (SW4), the horizontal cycle phase alters as shown in Fig. 3.
   Setting can be made from 0 to 15 and as the phase alters as in Ⓑ of Fig. 3 when 0, Ⓐ of Fig. 3 when 15, match to center of screen by setting. The setting of SW4 is shipped in the state of Fig. 4.

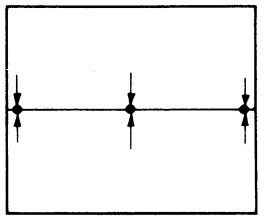


Fig. 1

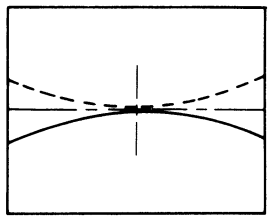


Fig. 2

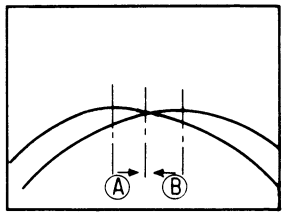


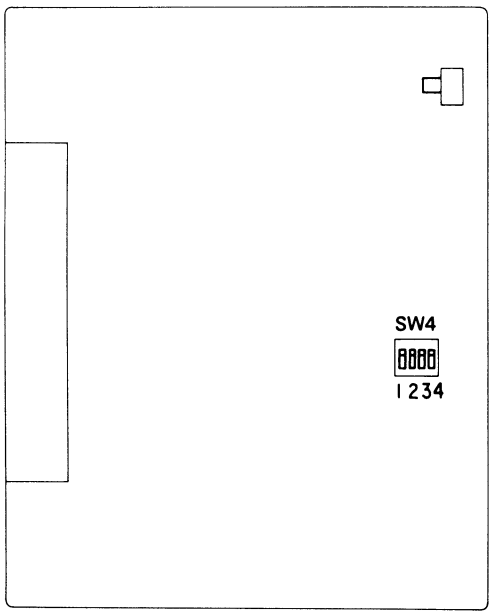
Fig. 3

1	ON
2	OFF
3	ON
4	ON

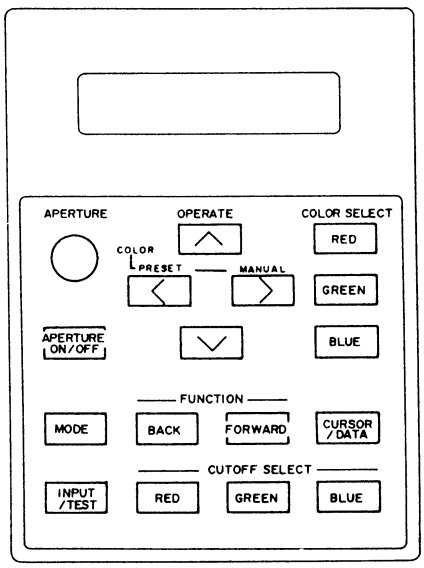
SW4

Fig. 4

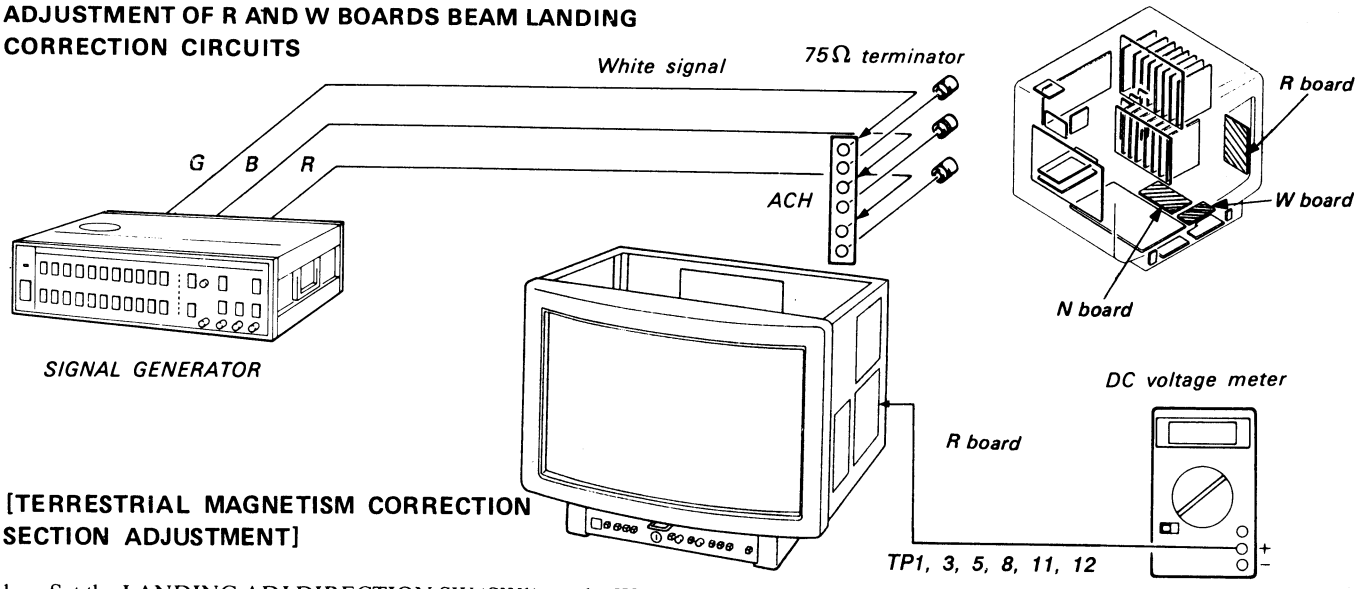
DB board



CONTROL UNIT (N board)



ADJUSTMENT OF R AND W BOARDS BEAM LANDING CORRECTION CIRCUITS



[TERRESTRIAL MAGNETISM CORRECTION SECTION ADJUSTMENT]

1. Set the LANDING ADJ DIRECTION SW (SW1) on the W board to SE (6).
2. Connect a DC voltmeter to TP1 of the R board and adjust the RV1 so that the output voltage becomes 2.00±0.01 Vdc.
3. Set the LANDING ADJ DIRECTION SW to S (8).
4. Connect a DC voltmeter to TP3 on the R board and adjust the RV2 so that the output voltage becomes 3.00 ± 0.01 Vdc.

Note: This setting value is for 0.25 gauss of the horizontal section of the terrestrial magnetism. If the horizontal section value differs, make the adjustment in reference to section 4-5. SET-UP ADJUSTMENT.

[ADJUSTMENT OF THE BEAM CURRENT CORRECTION SECTION]

1. Cut off R. G. B together with the CUT OFF SELECT on the sub control panel of control unit (N board).
2. Connect a DC voltmeter to TP5 on the R board and adjust the RV3 so that the output becomes 60±20 mV.
3. Receive the white signal (internal or external signal).
4. Turn on the CONTRAST MANUAL SW on the front panel and adjust the CONTRAST control so that the TP5 output becomes 2.2 Vdc.
5. Connect TP5 and TP6, TP5 and TP7, with short clips, respectively.
6. Connect a DC voltmeter to TP8 and adjust the RV4 so that the output becomes 0±0.1 Vdc.
7. Connect TP5 and TP9, TP5 and TP10, with short clips, respectively.
8. Connect a DC voltmeter to TP11 and adjust the RV5 so that the output becomes 0±0.1 Vdc.

[OPERATION CONFIRMATION METHOD OF LANDING ADJUSTMENT (W BOARD)]

1. Receive the white signal (internal or external signal).
2. Select pure green color by the CUT OFF SELECT on the N board and match the LANDING ADJ DIRECTION SW (SW1) to E (4).
3. Set to ON both the LANDING ADJ ON/OFF SW (SW2) and LANDING FINE ADJ ON/OFF SW (SW3) on the W board.
4. Set the volumes RV7 to RV12 to the mechanical center.
5. Confirm that the left upper corner becomes redish when RV1 is turned counterclockwise and it becomes blueish when turned clockwise. Keep the poor purity as it is.
6. Confirm the same with RV2 to RV6 and keep them in poor purity.
7. Set the LANDING FINE ADJ ON/OFF SW (SW3) to OFF and confirm that the purity becomes good.
8. Set the LANDING FINE ADJ ON/OFF SW (SW2) to ON.
9. Set the LANDING FINE ADJ ON/OFF SW (SW2) to OFF and confirm that the purity becomes good.
10. Set the LANDING ADJ ON/OFF SW to ON.
11. Set the volumes RV1 to RV6 to the mechanical center.
12. Set the LANDING FINE ADJ ON/OFF SW (SW3) to OFF.
13. Turn the LANDING ADJ DIRECTION SW (SW1) by one step at a time and confirm that the screen color smoothly changes.

Note:

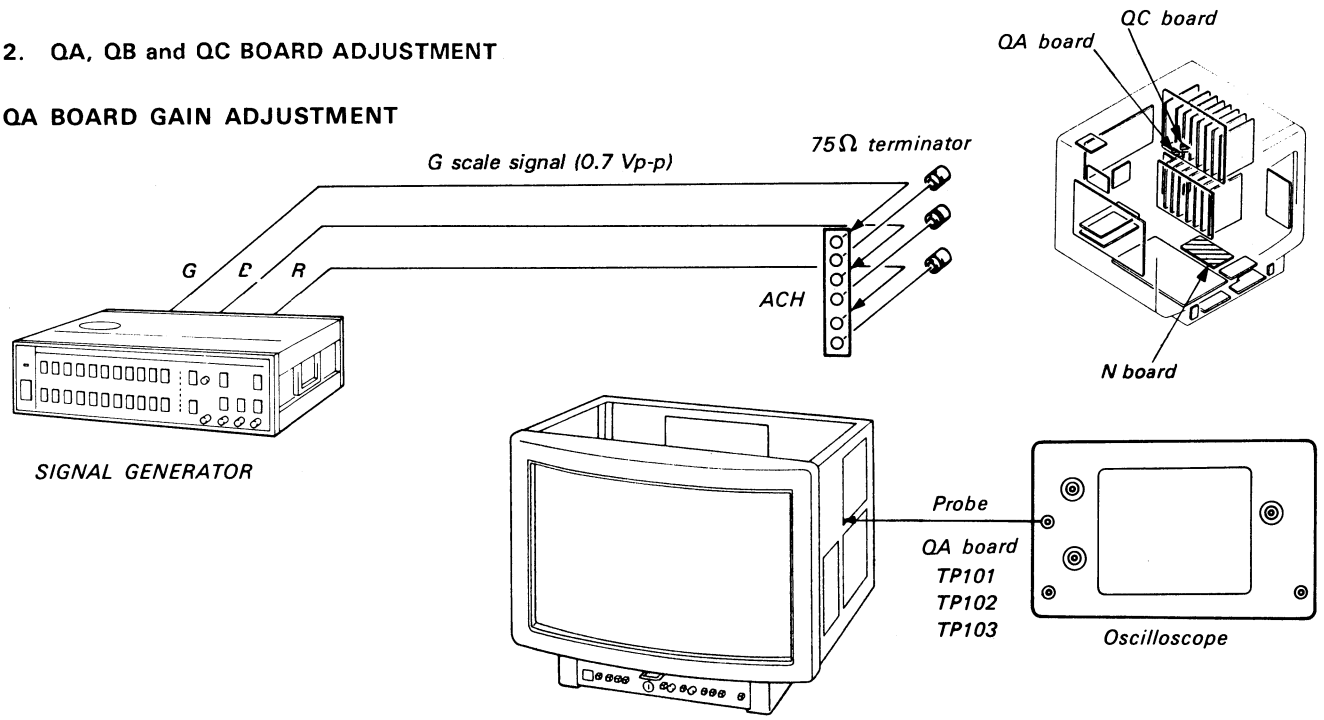
W board

RV1	RV3	RV5
RV2	RV4	RV6

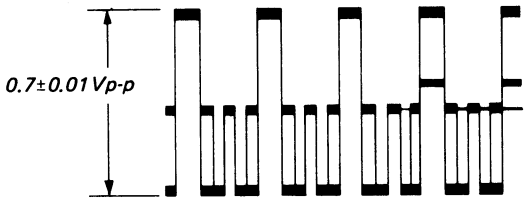
- The screen corresponds to the adjustment volumes (RV1 to RV6).
- For the adjustment method of volumes RV7 to RV12, see section 4-5. SET-UP ADJUSTMENT.

2. QA, QB and QC BOARD ADJUSTMENT

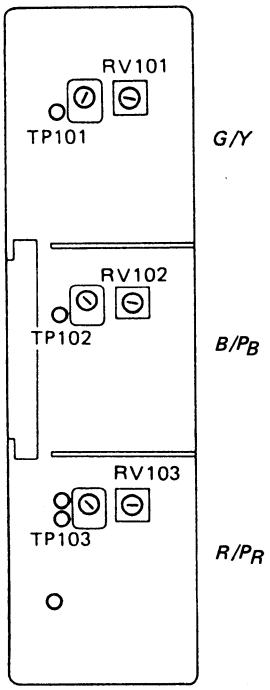
QA BOARD GAIN ADJUSTMENT



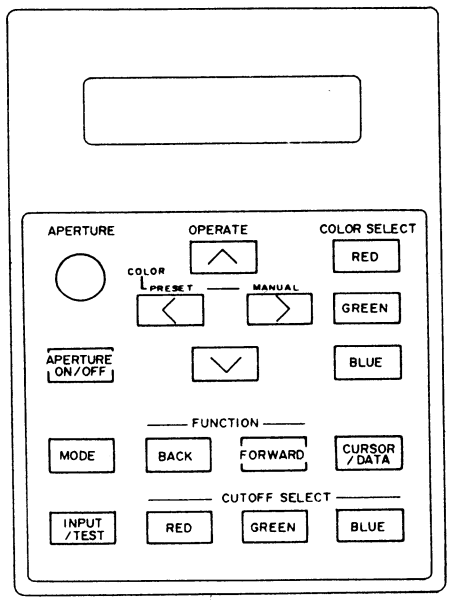
1. Remove the QC board.
2. Input the G SCALE signal.
3. Cut off all RED, GREEN and BLUE of the control unit (N board).
4. Adjust the video signal level (excluding the SYNC signal level) section of the TP101, TP102 and TP103 on the QA board to 0.7 ± 0.01 Vp-p using RV101, RV102 and RV103.



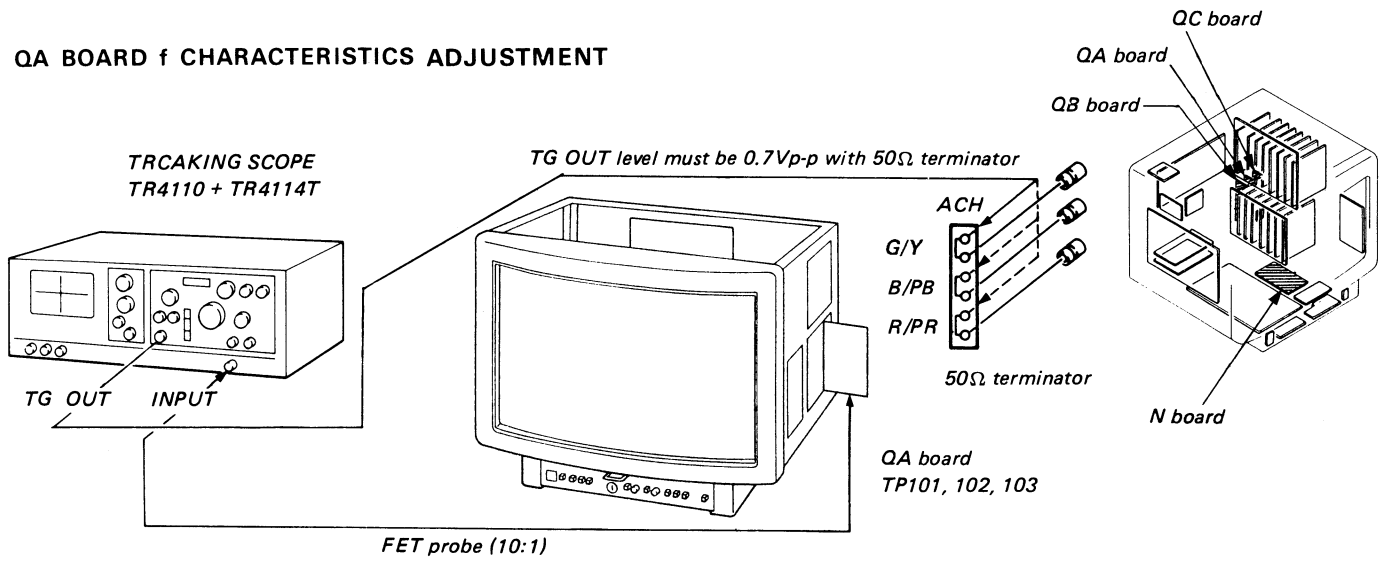
QA board



CONTROL UNIT (N board)



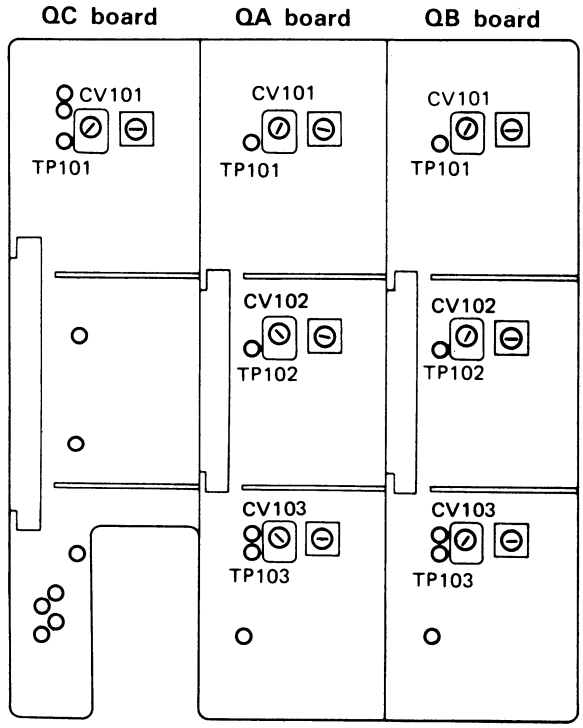
QA BOARD f CHARACTERISTICS ADJUSTMENT



1. Cut off all RED, GREEN and BLUE of the control unit (N board).
2. Input the output signal of the tracking generator to the GREEN/Y terminal. Match the f characteristics of TP101 with CV101 to ±0.5 dB in the range of 60 to 30 MHz.
3. Input the output signal of tracking generator to the BLUE/P_B terminal. Match the f characteristics of TP102 with CV102 to ±0.5 dB in the range of 60 to 30 MHz.
4. Input the output signal of tracking generator to the RED/P_R terminal. Match the f characteristics of TP103 with CV103 to ±0.5 dB in the range of 60 to 30 MHz.

[QB BOARD GAIN ADJUSTMENT]

Input the signal to the QB board. Other measurements are the same with that on the QA board gain adjustment.



[QB BOARD f CHARACTERISTICS ADJUSTMENT]

Input the signal to the QB board.Other measurements are the same with that on the QA board f characteristics adjustment.

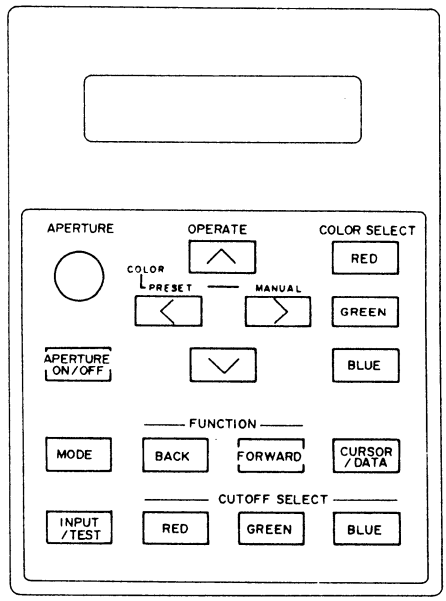
[QC BOARD GAIN ADJUSTMENT]

Input signal to EXT SYNC on QC board. TP is 101 and RV is 101 and other measurements are the same with that on the QA board gain adjustment.

[QC BOARD f CHARACTERISTICS ADJUSTMENT]

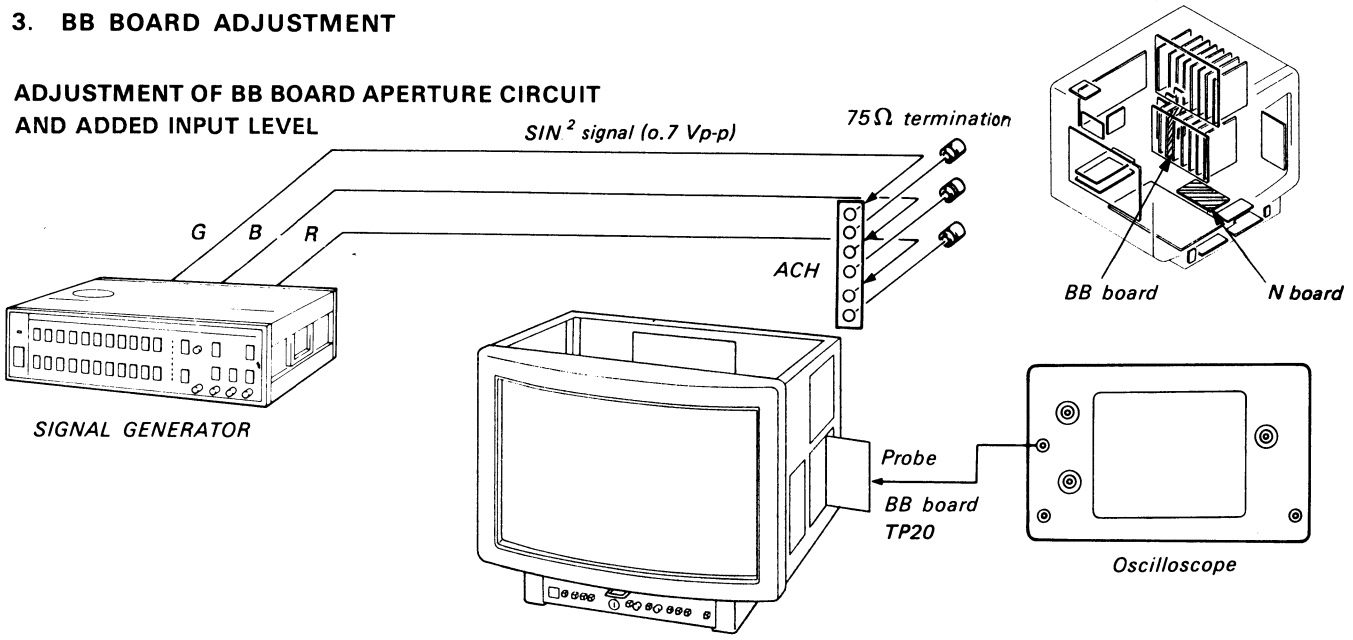
Input the signal to EXT SYNC on the QC board. TP is 101 and RV is 101, match to adjustment range of ± 1 dB. Other measurements are the same with that on the QA board f characteristics adjustment.

CONTROL UNIT (N board)

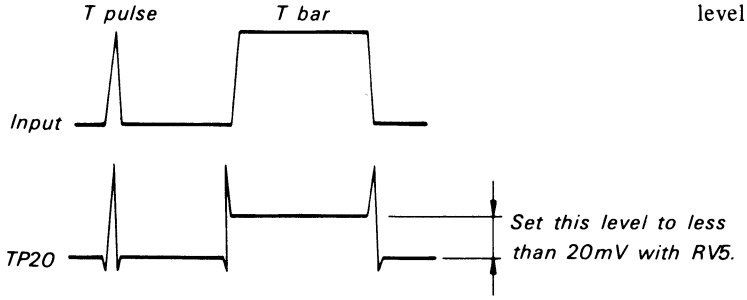


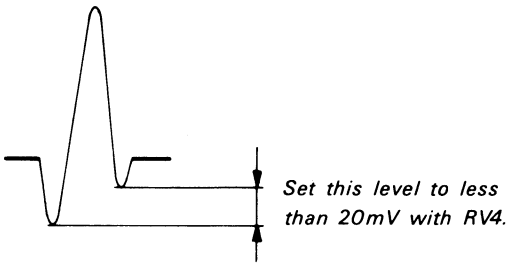
3. BB BOARD ADJUSTMENT

ADJUSTMENT OF BB BOARD APERTURE CIRCUIT AND ADDED INPUT LEVEL

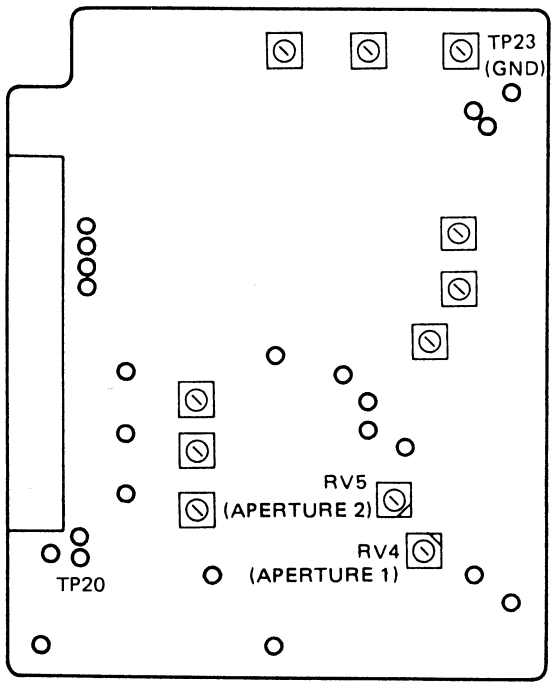


1. Input the SIN^2 signal.
2. Set the APERTURE SW on the control unit (N board) to ON.
3. Set the APERTURE VR to maximum.
4. Cut off all RED, GREEN and BLUE on the control unit (N board).
5. Connect YH (TP20) of the BB board to an oscilloscope.
6. Adjust with RV4 and RV5 of the BB board to make the level below 20mV as shown in Fig.

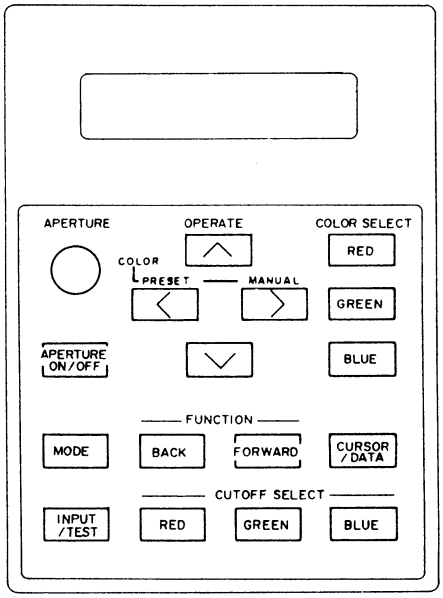




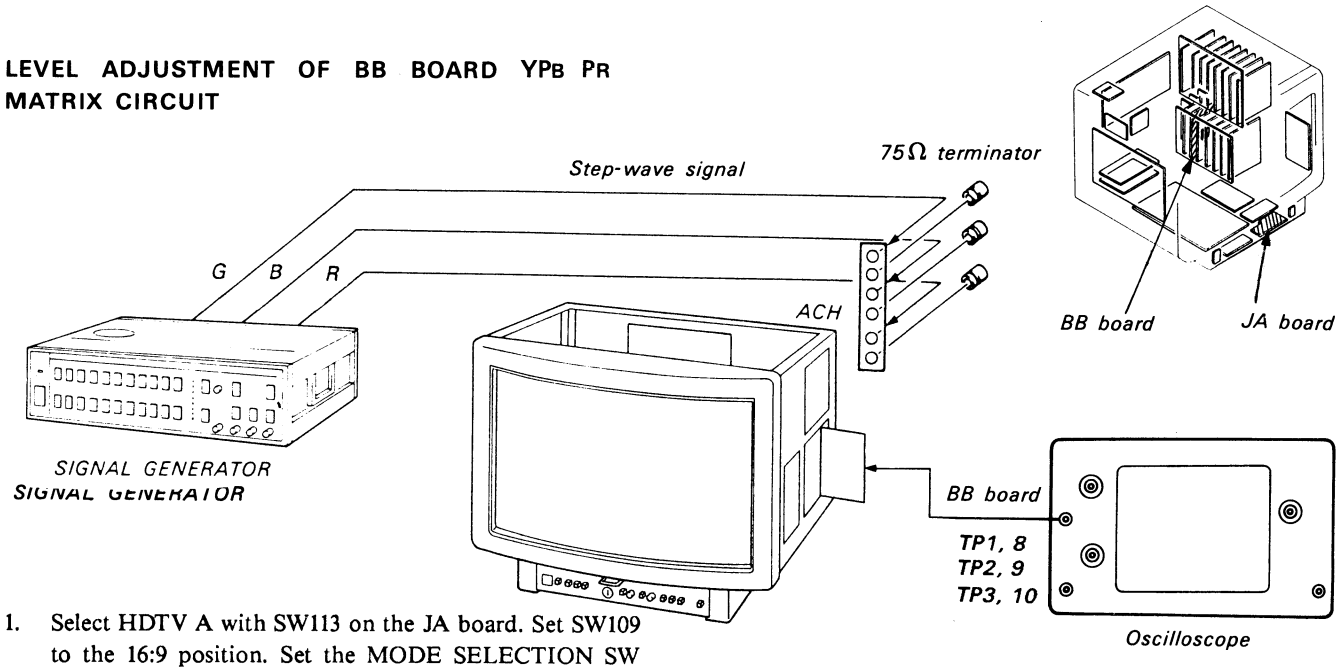
BB board



CONTROL UNIT (N board)



LEVEL ADJUSTMENT OF BB BOARD YPB PR MATRIX CIRCUIT

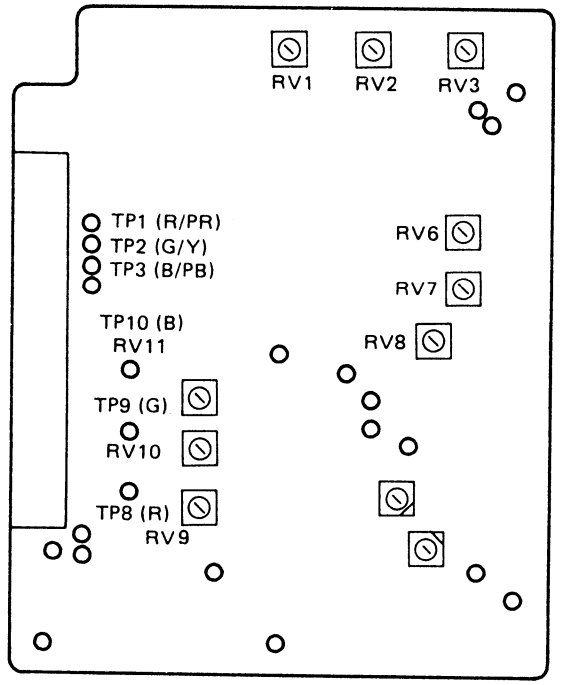


1. Select HDTV A with SW113 on the JA board. Set SW109 to the 16:9 position. Set the MODE SELECTION SW (COLOR/B&W) on the front panel to the COLOR position.

[LEVEL ADJUSTMENT OF RGB AND Y]

2. Remove J1 and J2 from the BB board.
3. Set SW102 on the JA board to the GBR position and measure the AMPLITUDE VR1 of R OUT (TP8) in the RGB mode.
4. Set SW102 on the JA board to the Y PB PR position and adjust RV1 so that amplitude of R OUT (TP8) in Y PB PR mode becomes VR1 ± 10 mVp-p.
5. Adjust G OUT and B OUT in the same manner as R OUT.
   G OUT TP9, RV2
   B OUT TP10, RV3
6. Change over SW102 on the JA board and confirm that the screen colors do not change in RGB mode and Y PB PR mode. If colors change, repeat all steps starting from step 3.
7. Insert back J1 and J2.

BB board



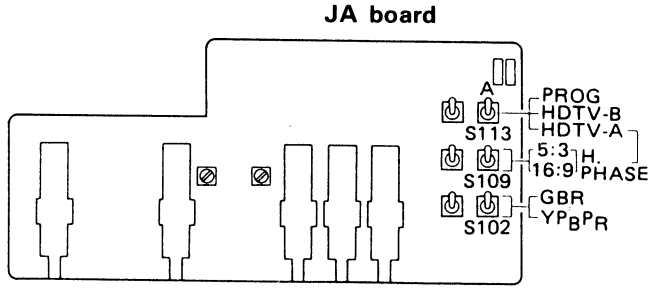
[LEVEL ADJUSTMENT OF RGB AND B&W]

8. Set SW102 on the JA board to the RGB position.
9. Set the MODE SELECTION SW (COLOR/B&W) on the front panel to the B&W position and measure amplitude VR2 of R OUT (TP8) in B&W mode.
10. Set MODE SELECTION SW (COLOR/B&W) on the front panel to COLOR position and adjust RV6 so that amplitude of R OUT (TP8) in the COLOR mode becomes VR2 ± 10 Vp-p.
11. Adjust G OUT and B OUT in the same manner as R OUT.
    G OUT TP9, RV7
    B OUT TP10, RV8
12. Change over the MODE SELECTION SW (COLOR/B&W) on the front panel and confirm that the colors on the screen are the same in both RGB mode and B&W mode.
    If they have changed, repeat all steps starting from step 8.

[LEVEL ADJUSTMENT OF RGB]

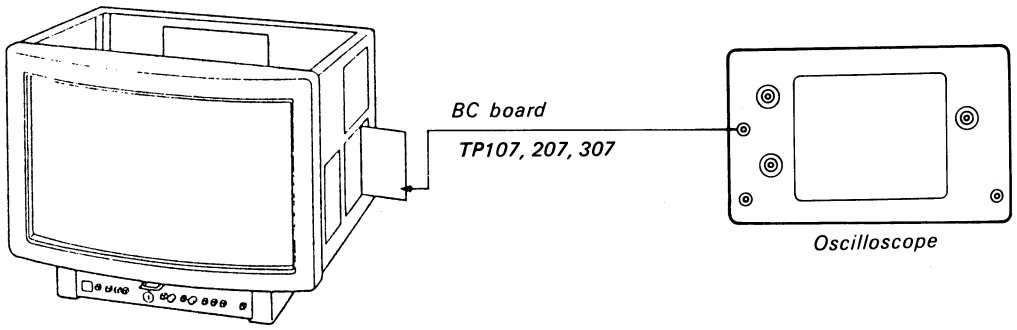
13. Set SW102 on the JA board to RGB, and the MODE SELECTION SW (COLOR/B&W) on the front panel to COLOR.
14. Measure amplitude VR3 of R IN (TP1).
15. Adjust RV9 so that amplitude of R OUT (TP8) becomes VR3 ± 10 mVp-p.
16. Adjust G OUT and B OUT in the same manner.
    G ..... TP2 (G IN), TP9 (G OUT), RV10
    B ..... TP3 (B IN), TP10 (B OUT), RV11

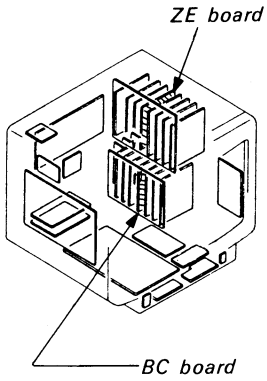
JA board



4. BC BOARD ADJUSTMENT

ADJUSTMENT OF BC BOARD CONTROL OFFSET AND VIDEO GAIN





[DIGITAL UNIFORMITY CONTROL OFFSET ADJUSTMENT]

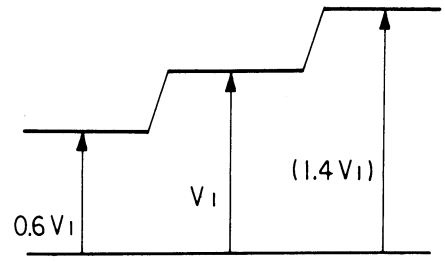
1. Receive the white signal (internal signal).
2. Set the position of SW1 on the ZE board to **1.**
3. Set the BRIGHTNESS MANUAL SW on the front panel to ON, and turn the BRIGHTNESS control fully clockwise.
4. Connect an oscilloscope to R-OUT (TP107) of the BCboard and adjust R-OFFSET (RV102) so that the video ampoitude becomes within ± 10mV of the value when pins ① and ② of connector BN-22 on the BN board are short circuited/opened.

Note: Due to a difference of characteristics between IC103 and IC105, the clamp level may be slightly different when **SW4** is selected. However, pay strict attention to the relative amplitude.

5. Connect an oscilloscope to G-OUT (TP207) on the BC board and adjust G-OFFSET (RV202) as in the above.
6. Connect an oscilloscope to B-OUT (TP307) on the BC board and adjust B-OFFSET (RV302) as in the above.
7. Short circuit/open BN-22 and confirm that the luminance and the hue of the screen do not change. If they change excessively, perform again from step 4 above.

[GAIN ADJUSTMENT]

1. Receive the white signal (internal signal).
2. Set the position of SW1 of the ZE board to 2, and switch the adjustment signal.
3. Connect an oscilloscope to R-OUT (TP107) on the BC board and adjust R-GAIN (RV201) so that the highest level becomes 1.4 times of the middle level.
4. Connect an oscilloscope to G-OUT (TP207) on the BC board and adjust the G-GAIN (RV201) so that the highest level becomes 1.4 times of the middle level.

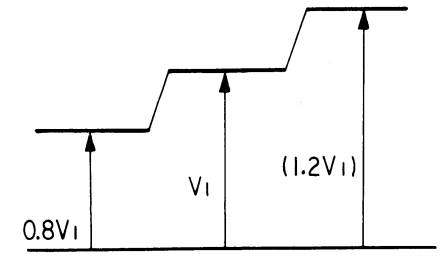


TP-107

6. Connect an oscilloscope to B-OUT (TP307) on the BC board and adjust B-GAIN (RV301) so that the highest level becomes 1.4 times of the middle level.

[BRIGHT LINKAGE RATIO ADJUSTMENT]

1. Receive the white signal (internal signal).
2. Turn the BRIGHTNESS control on the front Panel fully counterclockwise.
3. Connect an oscilloscope to R-OUT (TP107) of the BC board and adjust BRT (RV1) so that the highest level becomes 1.2 times of the middle level.



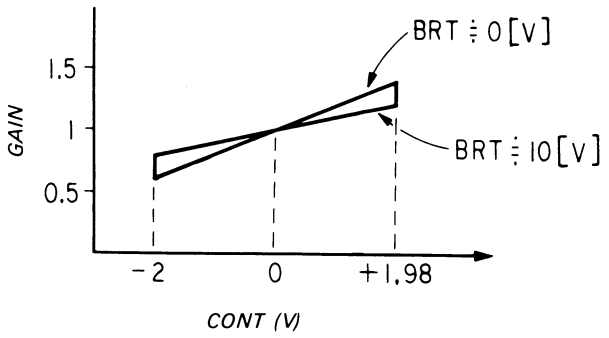
TP-107

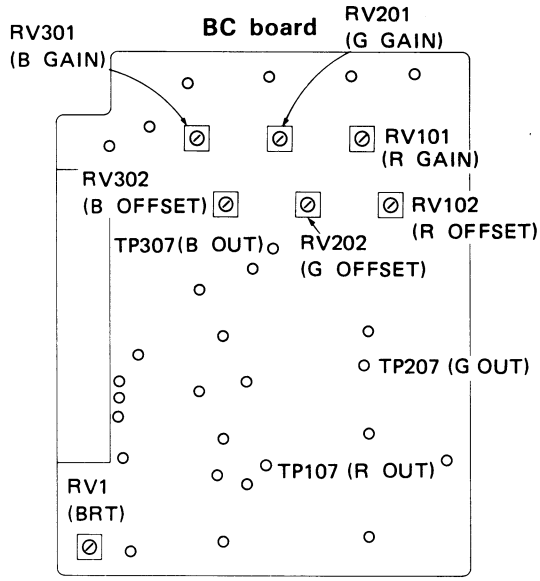
4. Confirm that the above relationship of the gain exists also for G-OUT (TP207) and B-OUT (TP307) on the BC board.

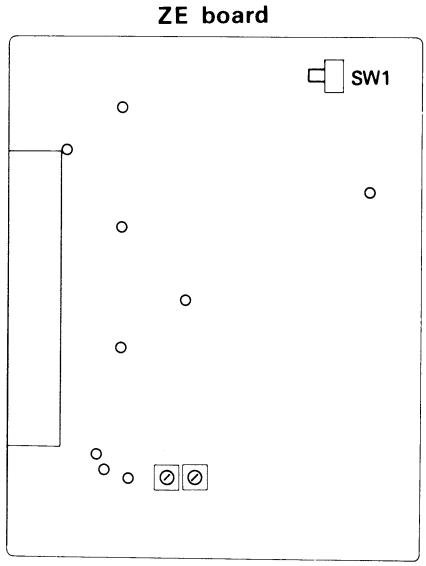
Note: Table shows the hain changes.

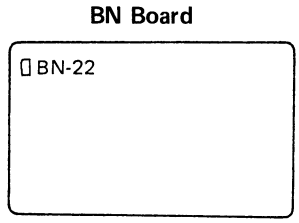
	TP1 BRT [V]	TP101 TP201 TP301 CONT[V]	GAIN of VIDEO	Modulation ratio (%)
Dark ↕ Bright	10	−2 0 +1.98	0.8 1 1.2	±20
	5	−2 0 +1.98	0.7 1 1.3	±30
	0	−2 0 +1.98	0.6 1 1.4	±40

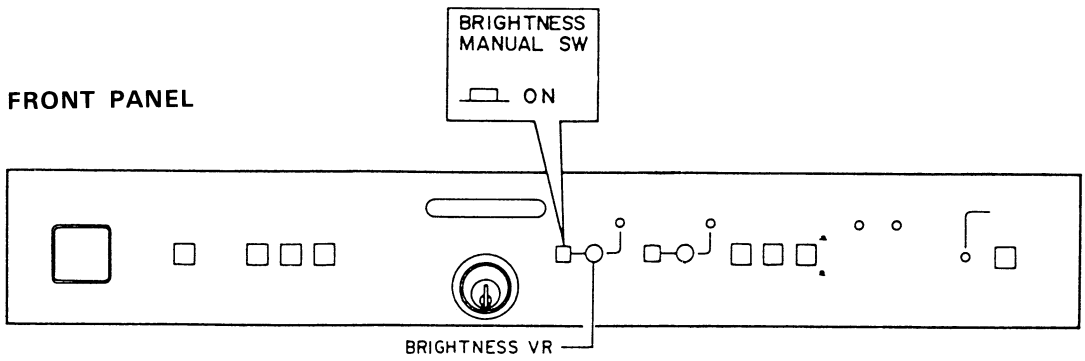
Gain change width by BRIGHT VR





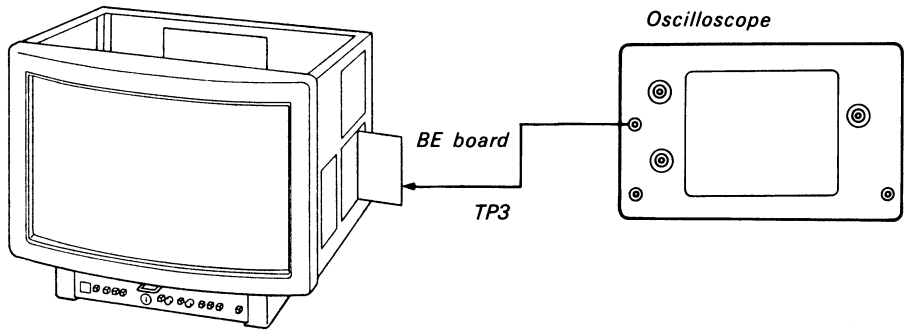


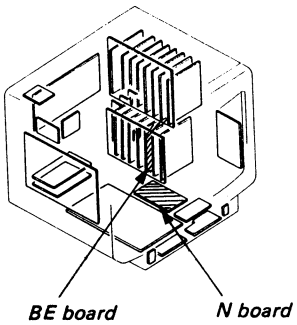




5. BE BOARD ADJUSTMENT

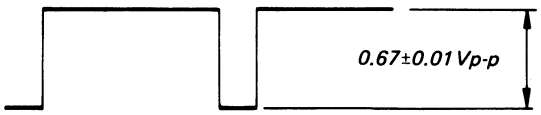
BE BOARD VIDEO OUT LEVEL ADJUSTMENT





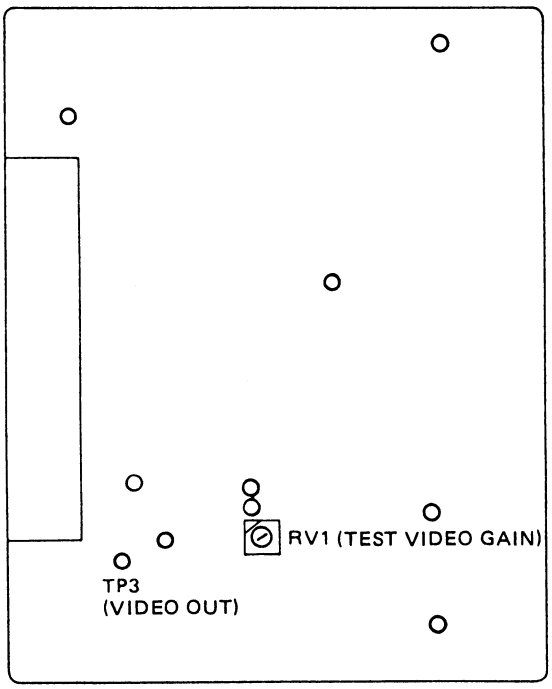
1. Press the INPUT/TEST key on the control unit (N board) and display the following.

```
FLAT FIELD:HD-A
COLOR-PRESET RGB
```

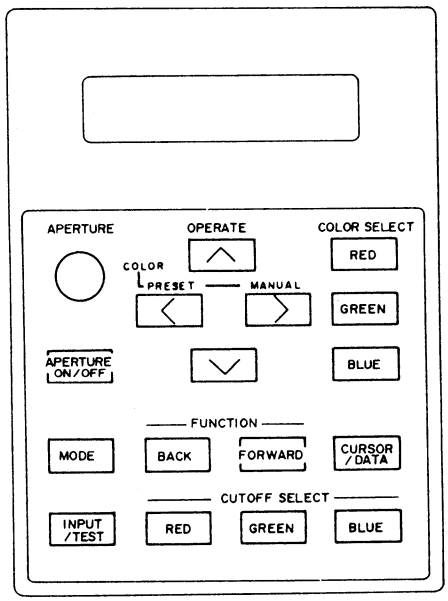


2. Connect an oscilloscope to TP3 (VIDEO OUT) of the BE board and adjust RV1 (TEST VIDEO GAIN) so that the level becomes 0.67±0.01 Vp-p.

BE board

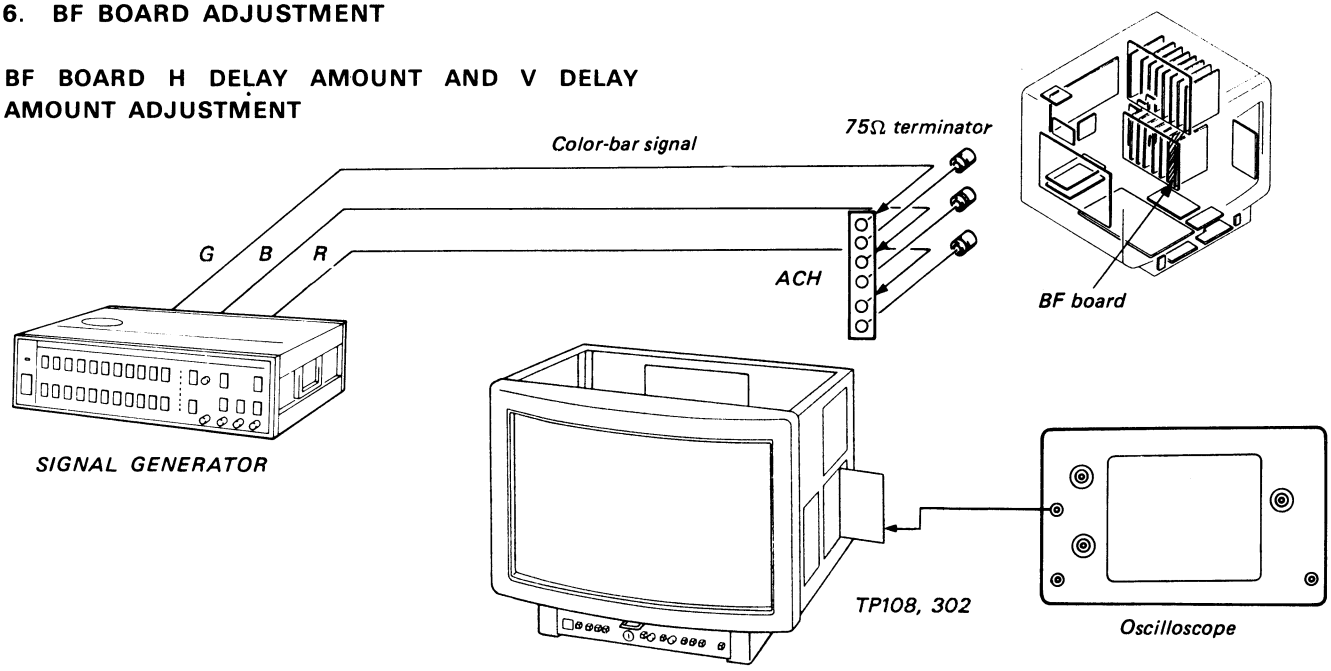


CONTROL UNIT (N board)



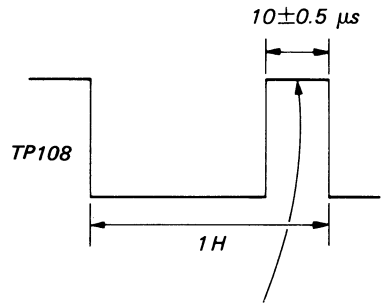
6. BF BOARD ADJUSTMENT

BF BOARD H DELAY AMOUNT AND V DELAY AMOUNT ADJUSTMENT



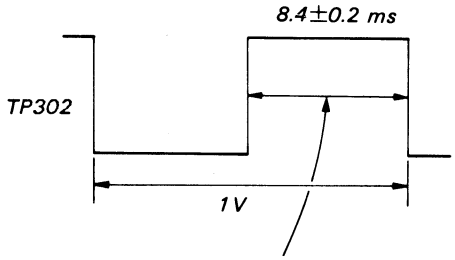
1. Input the color bar signal.
2. Monitoring TP108 on the BF board with an oscilloscope, turn ON the H DELAY SW and adjust the H DELAY (RV102) on the BF board so that the pulse width becomes 10 ± 0.5 μsec.
3. Monitoring TP302 on the BF board with an oscilloscope, turn ON the V DELAY SW and adjust the V DELAY (RV301) on the BF board so that the pulse width becomes 8.4 ± 0.2 msec.

H Delay Amount Adjustment



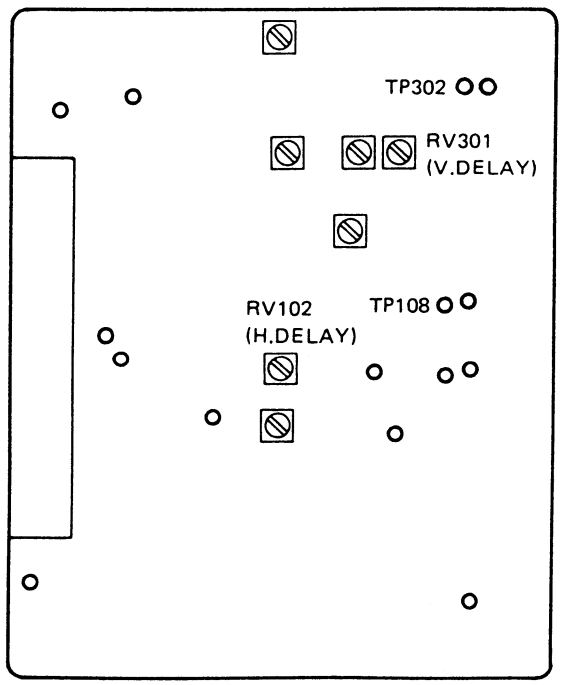
Adjust the pulse width to 10±0.5 μsec with RV102.

V Delay Amount Adjustment

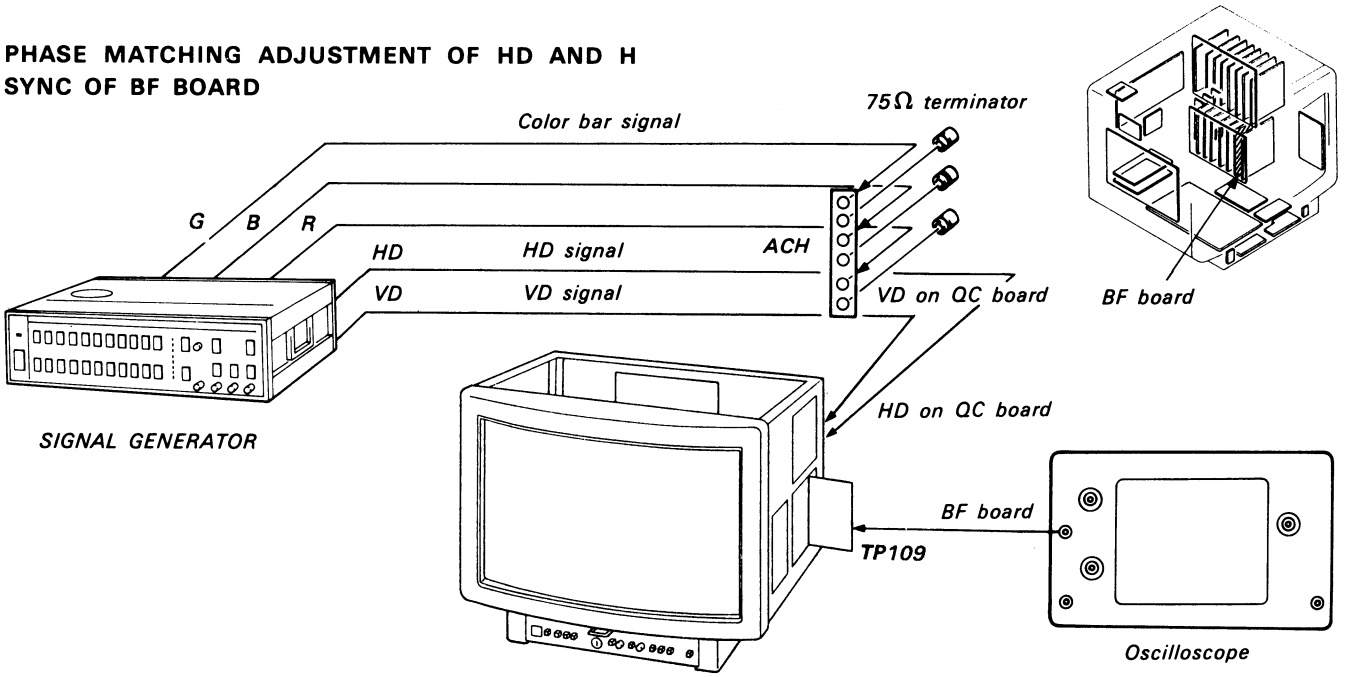


Adjust the pulse width to 8.4±0.2 msec with RV301.

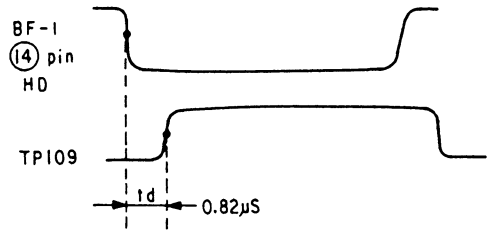
BF board



PHASE MATCHING ADJUSTMENT OF HD AND H SYNC OF BF BOARD

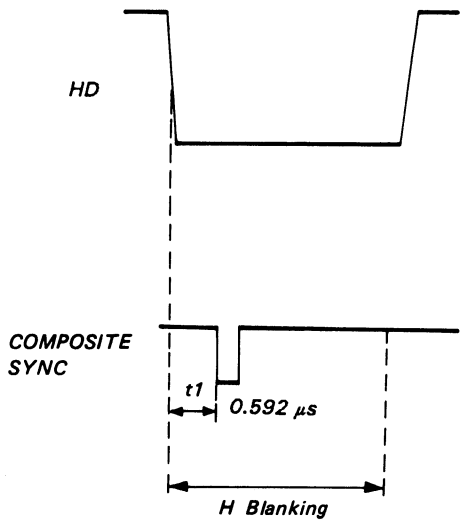


1. Input the color bar signal.
2. Monitoring the pin ⑭ connector BF-1 and TP109 on the BF board with oscilloscope, adjust RV101 so that td shown in Fig. blow becomes 0.82 μs. td should be measured the point where amplitude is 50%.

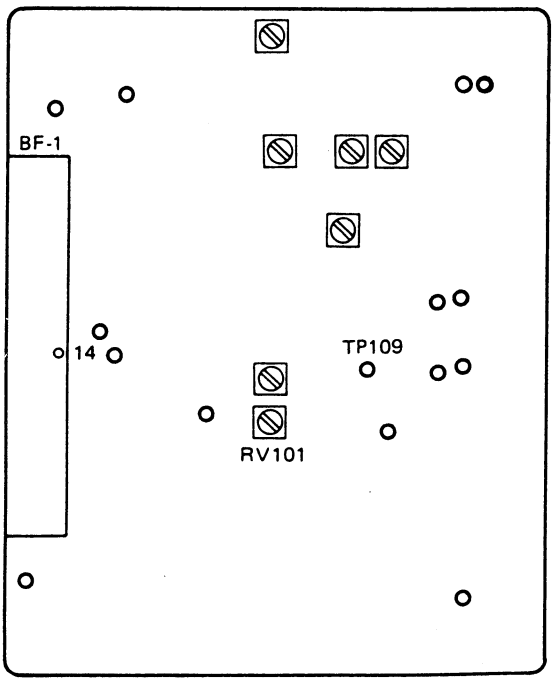


Note: At the time of shipment, input HD and H SYNC as shown in Fig. below and the phase is adjusted.

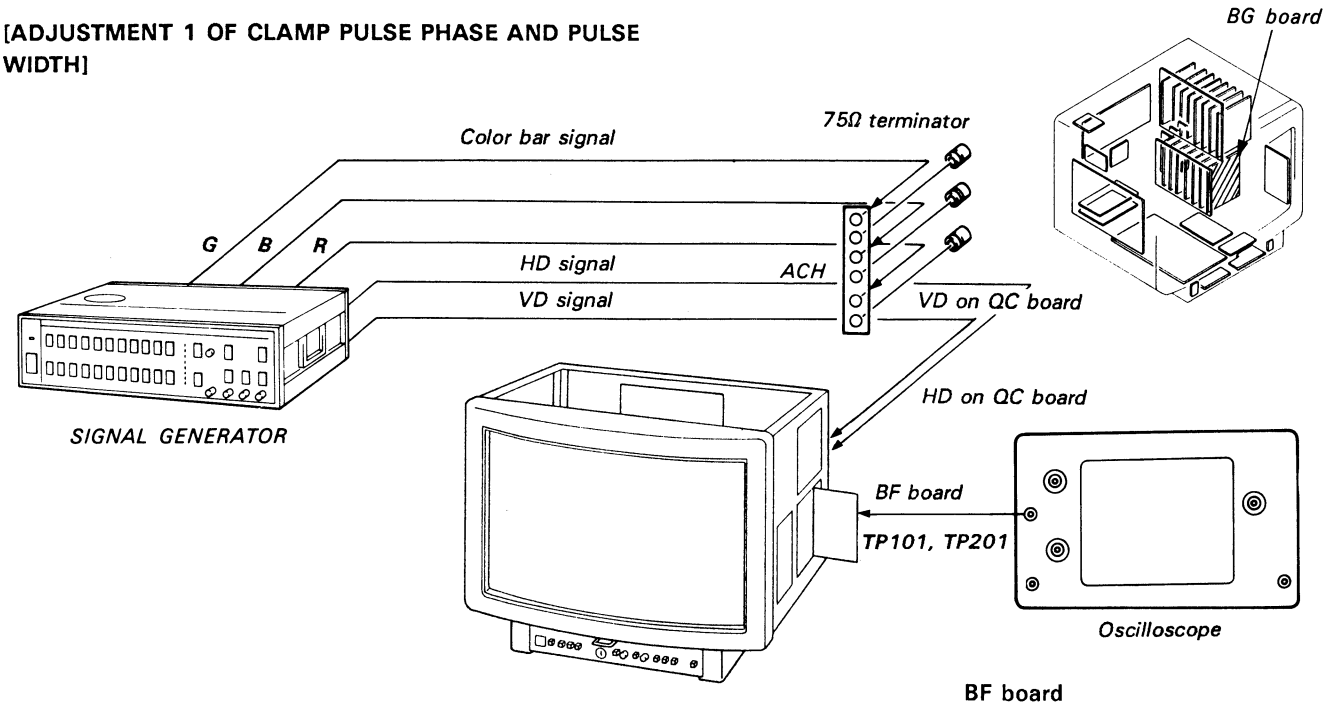
As shown in Fig. below, when different HD signal is input, re-adjust to obtain td=t1 + 0.23 (μs).



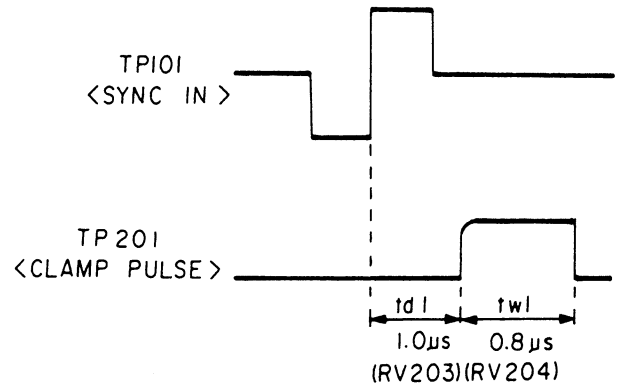
BF board



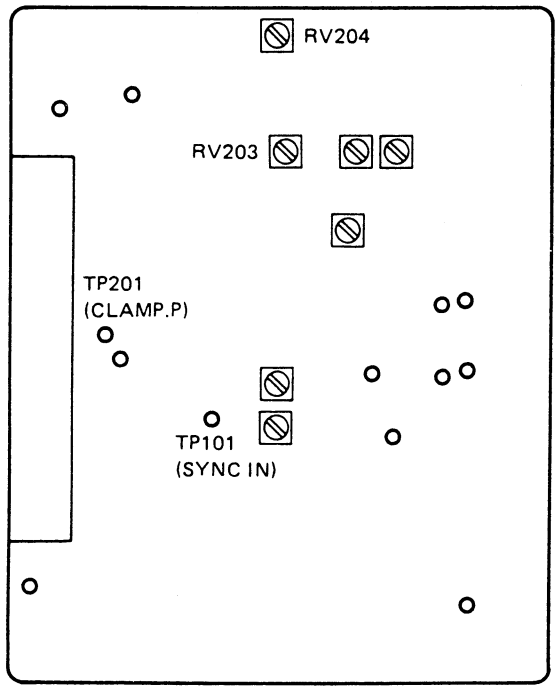
[ADJUSTMENT 1 OF CLAMP PULSE PHASE AND PULSE WIDTH]



1. Input the color bar signal.
2. Monitoring TP101 and TP201 on the BF board with an oscilloscope, adjust td_1 and tw_1 in Fig. below with RV203 and RV204. td_1 and tw_1 respectively should be the points where amplitude is 50%.



BF board



Note:

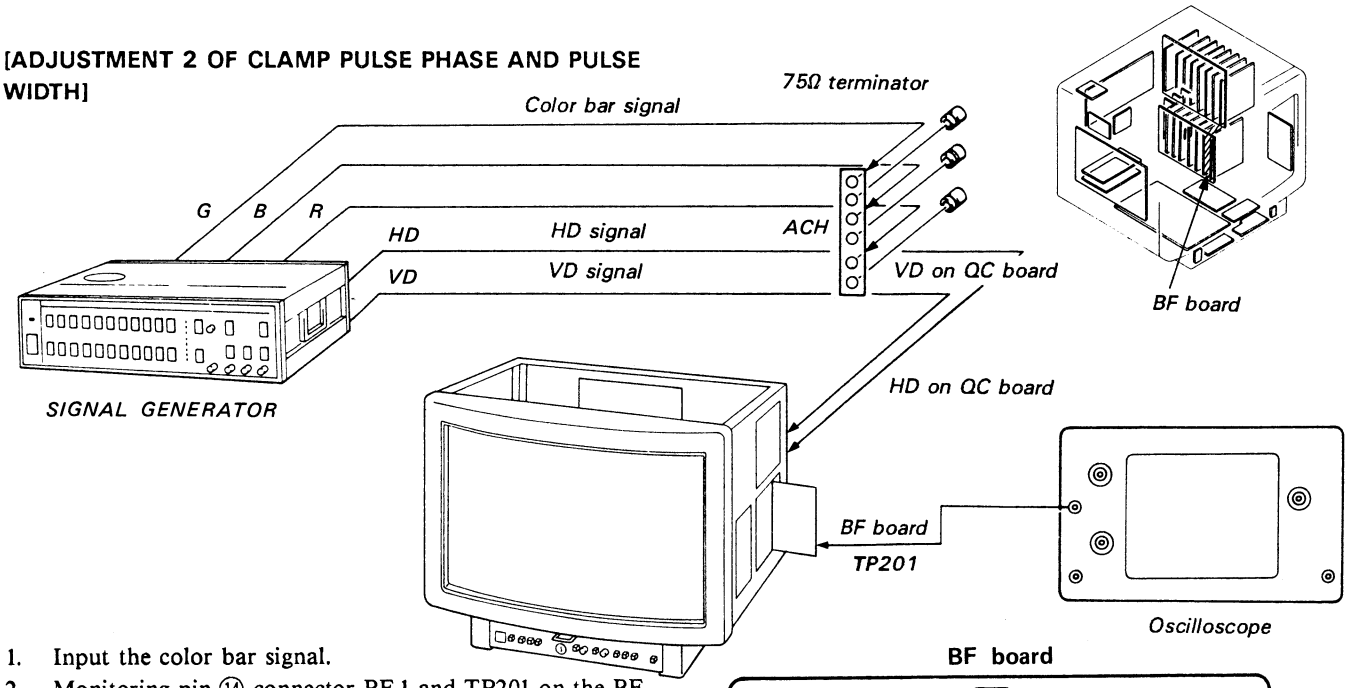
td_1 and tw_1 shown above are the values when the BTA/SMPTE standard for HDTVs and the former HDTV standard (Sony standard or Tsukuba Exposition standard) are input.

When a signal with a back porch of 1.8 μs or less is input, re-adjust to obtain the following.

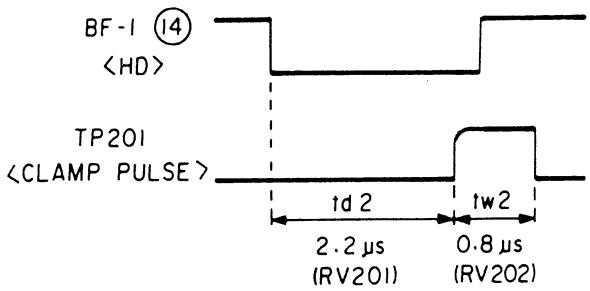
$td_1 + tw_1 <$ BACk-porch period

$tw_1 \geqq 0.8$ μs.

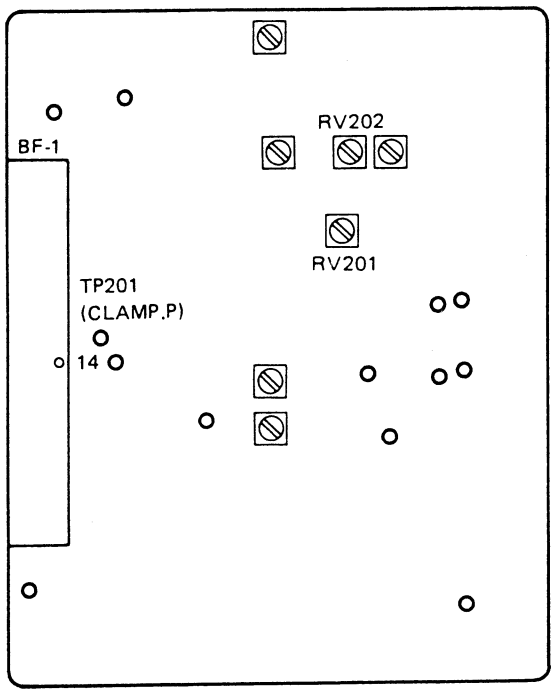
[ADJUSTMENT 2 OF CLAMP PULSE PHASE AND PULSE WIDTH]



1. Input the color bar signal.
2. Monitoring pin ⑭ connector BF-1 and TP201 on the BF board with an oscilloscope, adjust td_2 and tw_2 in the Fig. below with RV201 and RV202. td_2 and tw_2 should be measured the points where amplitude is 50%.



BF board



Note:

As shown in Fig. 1, td_2 and tw_2 are values for the case of $t > 3.3$ μs.

As shown in Fig. 2, when the HD phase is delayed and $t \leqq 3.3$ μs, the clamp pulse enters into the video signal period. When the HD signal like $t \leqq 3.3$ μs is input, adjust to obtain the following.

$td_2 + tw_2 < t$

$tw_2 \geqq 0.8$ μs

Fig. 1

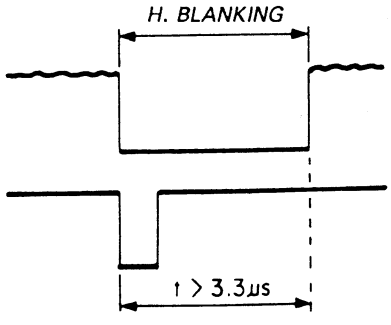
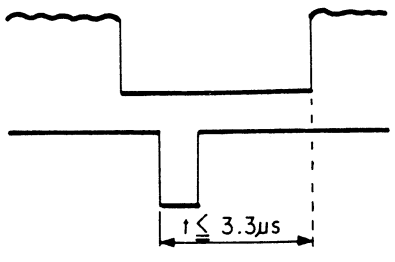
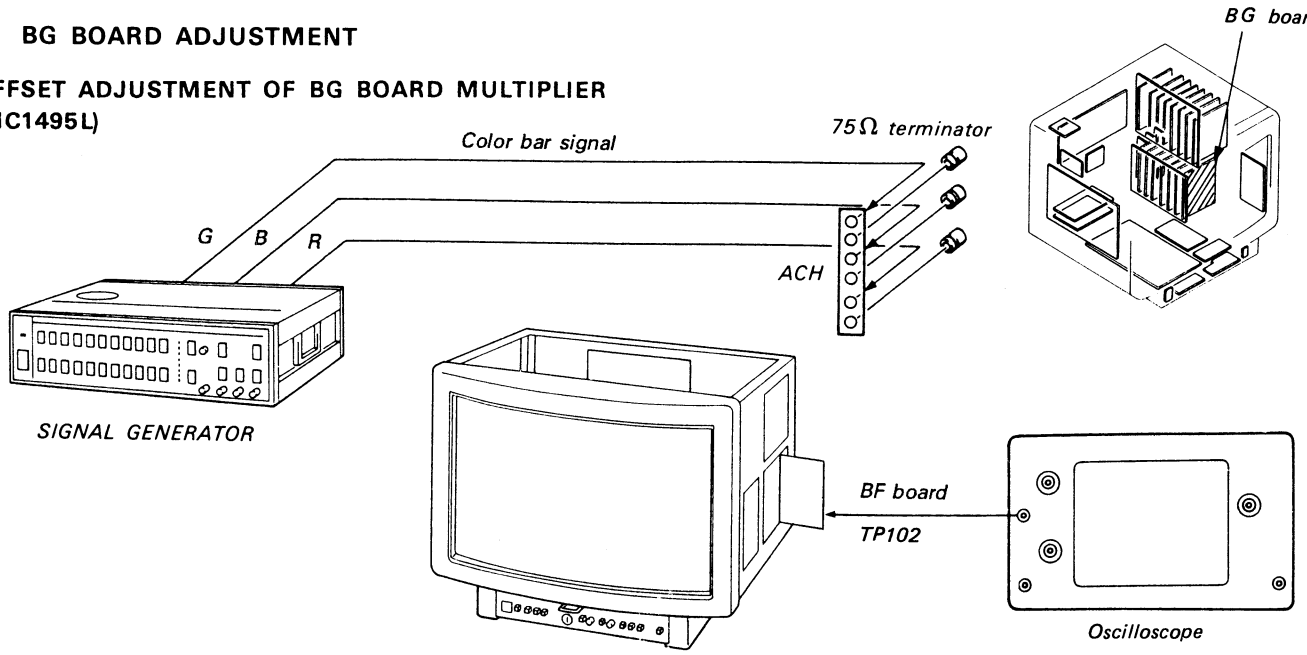


Fig. 2

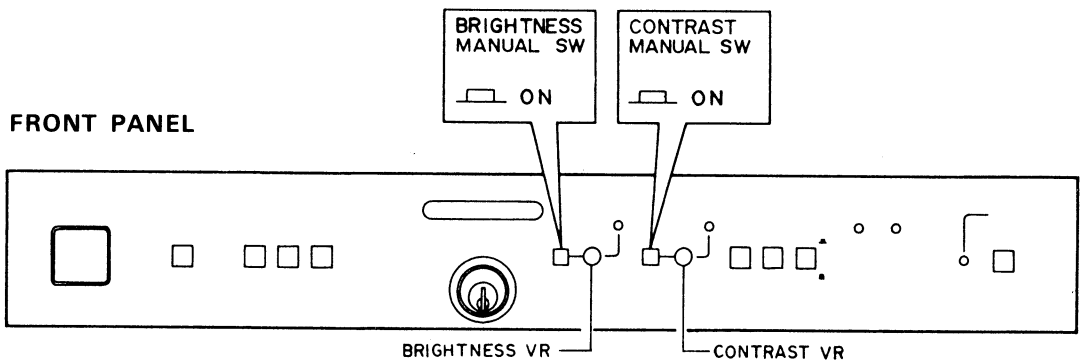


7. BG BOARD ADJUSTMENT

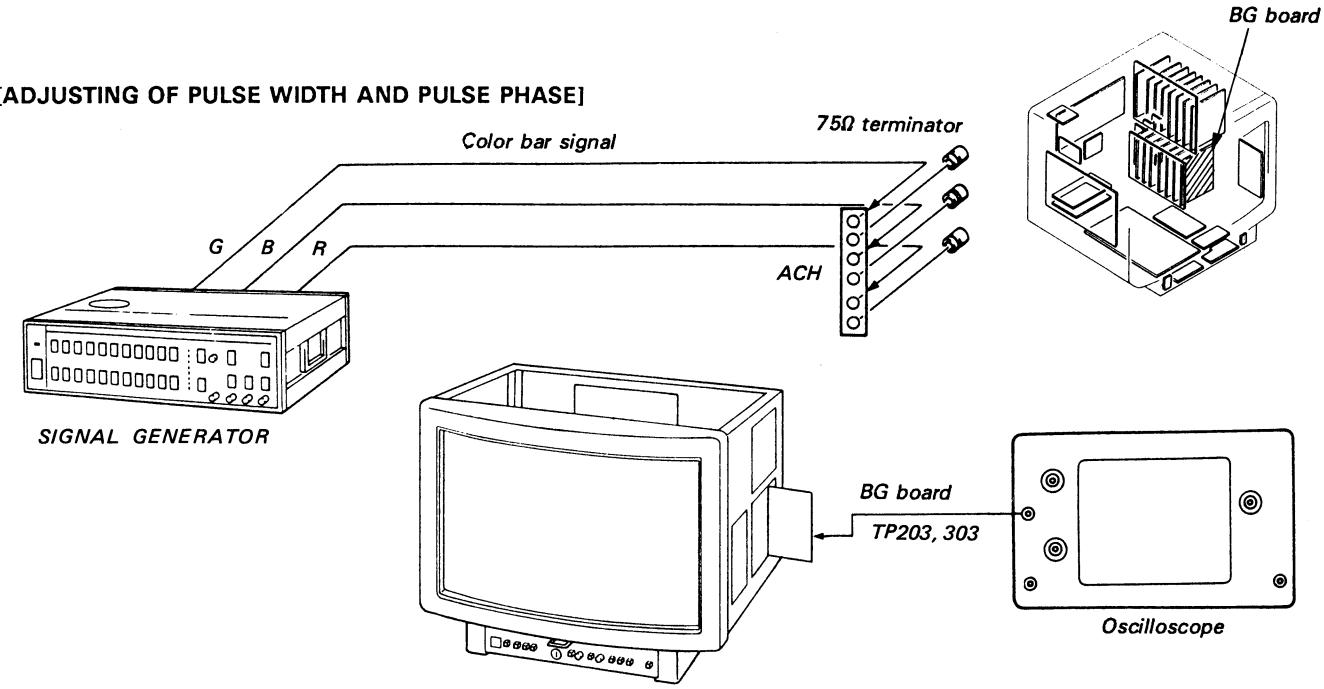
OFFSET ADJUSTMENT OF BG BOARD MULTIPLIER (MC1495L)



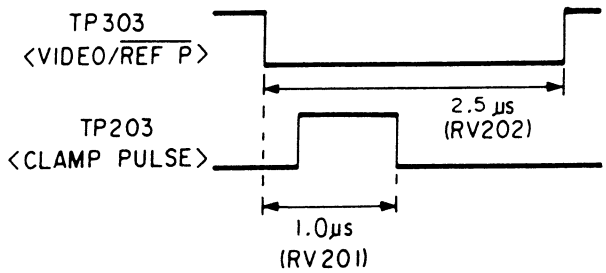
1. Input the dot signal.
2. Set the CONTRAST MANUAL SW to ON.
3. Set the BRIGHTNESS MANUAL SW to ON.
4. Connect TP106 on the BG board to GND.
5. Connect the oscilloscope probe to TP102 on the BG board.
6. Adjust OFFSET-2 (RV102) so that the DC level of TP102 does not change (amount of change within 20 mV) when the CONTRAST MANUAL control of the front panel is turned.
7. Remove TP106 on the BG board from GND and connect TP105 (CONTRAST) to GND.
8. Adjust OFFSET-1 (RV103) so that the DC level of TP102 does not change (amount of change within 20 mV) when the BRIGHTNESS MANUAL control of the front panel is turned.
9. While TP105 is connected to GND, adjust OFFSET-3 (RV101) so that the DC level of TP107 becomes 0V (0V±10 mV).

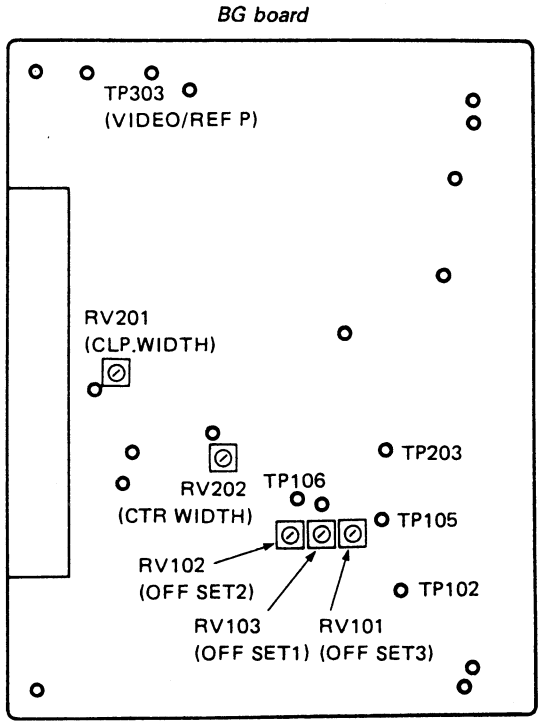


[ADJUSTING OF PULSE WIDTH AND PULSE PHASE]



1. Input the color bar signal.
2. As shown in the Fig. below, adjust the phases of TP303 and TP203 with RV201.
3. Adjust the pulse width of TP303 with RV202.



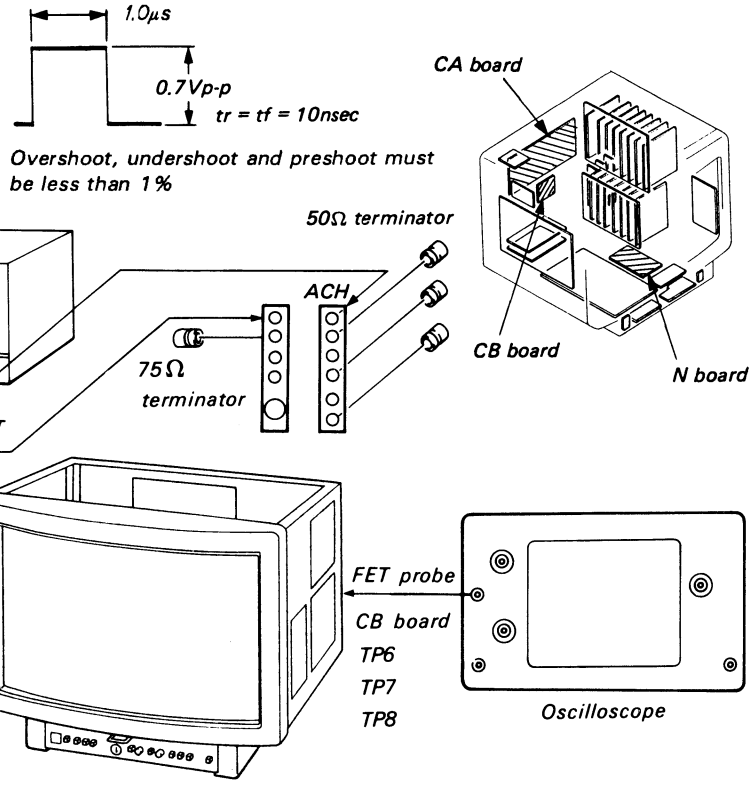


Note:

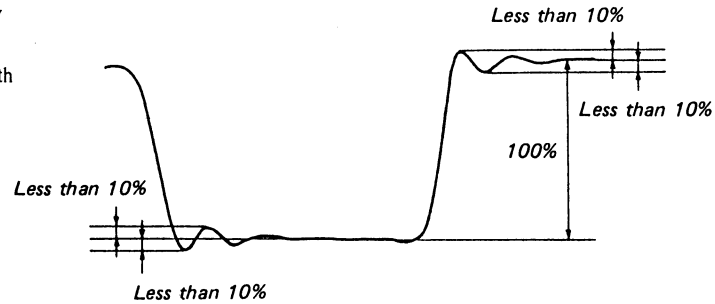
Measurements should be performed at 50% of the pulse amplitude.

8. CA BOARD ADJUSTMENT

CA BOARD PULSE RESPONSE ADJUSTMENT



1. Pulse response adjustment of KR.(Use a FET probe.)
   1) Set the SYNC SW of the front panel to EXT (⊓).
   2) Input the pulse generator output to R channel.
   3) Adhyst the TP6 (KR) amplitude on the CB board to40 Vp-p by turning the CONTRAST MANUALcontrol.
   4) Adjust the overshoot, undershoot and preshoot within10% with CV1, 2.
2. Adjust KG and KB in the same manner as the above.
   1) Adjust KG with TP7 and CV201, 202.
   2) Adjusut KB with TP8 and CV401, 402.
3. Set the [INPUT/TEST] key on the N board (Control unit) to the TEST side, and confirm that there is no smear in the GRAY SCALE.

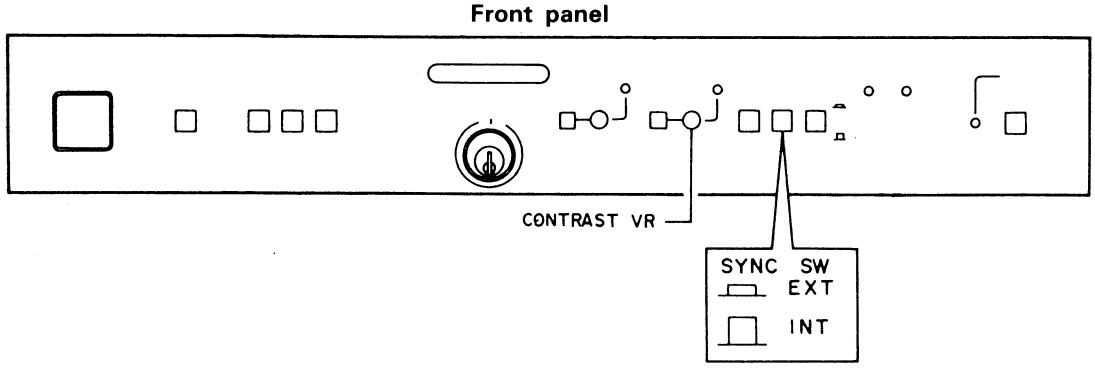


Waveform of TP6, TP7 and TP8

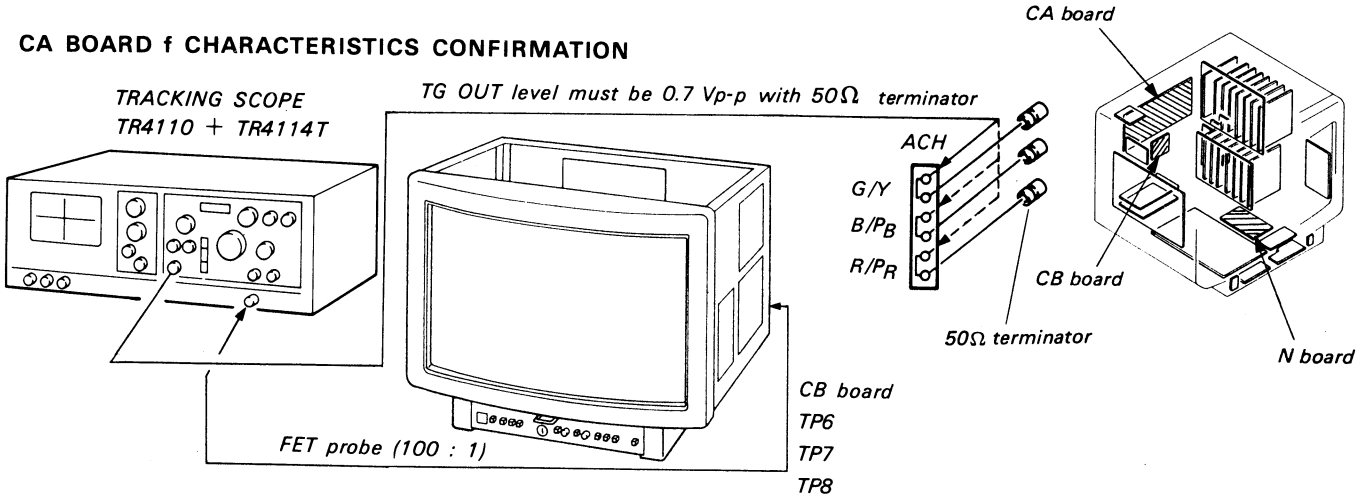
NOTE :

- As to the CA board and CB board, see page 4-50.
- The input signal should be 0.7Vp-p (during 50 Ω termination), the pulse width 1.0μsc rising and lowering times 10 nsec, and overshoot undershoot and preshoot less than 1%
- As to FET probe, use TEK P6201(1.5pF, 10MΩ , 100:1) or equivalent.

Front panel



CA BOARD f CHARACTERISTICS CONFIRMATION



[f CHARACTERISTICS CONFIRMATION OF KR]

1. Input the tracking scope output to R channel.
2. Adjust the TP6 (KR) amplitude on the CB board to to 40 V p-p by turning the CONTRAST MANUAL control.
3. Confirm that the f characteristics is within $^{+0.7}_{-0.4}$ dB in a range of 60 Hz to 30 MHz.

[f CHARACTERISTICS CONFIRMATION OF KG]

1. Input the tracking scope output to G channel.
2. Adjust the TP7 (KG) amplitude on the CB board to 40 Vp-p by turnign the CONTRAST MANUAL control.
3. Confirm that the f characteristics is within $^{+0.7}_{-0.4}$ dB in a range of 60 Hz to 30 MHz.

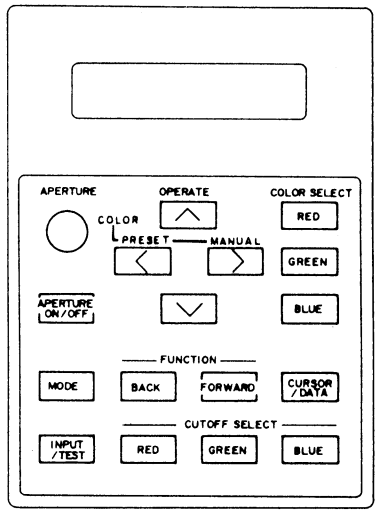
[f CHARACTERISTICS CONFIRMATION OF KB]

1. Input the tracking scope output to B channel.
2. Adjust the TP8 (KB) amplitude on the CB board to 40 Vp-p by turning the CONTRAST MANUAL control.
3. Confirm that the f characteristics is within $^{+0.7}_{-0.4}$ dB in a range of 60 Hz to 30 MHz.
4. Set the INPUT/TEST key on the control unit (N board) to the TEST side and be sure that there is no smear in the GRAY SCALE.

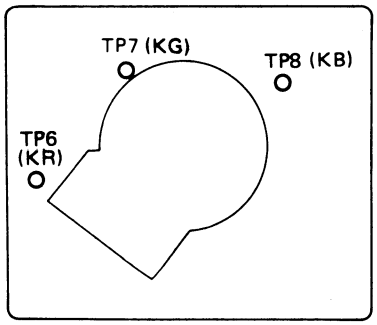
Note: If there are out of specifications, perform the adjustment in page 4-49 again and confirm the frequency characteristics.

- AS to FET probe, use TEK P6201(1.5pF, 10M Ω , 100:1) or equivalent.

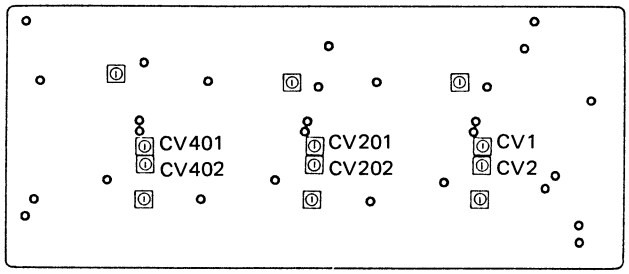
Control unit (N board)



CB board

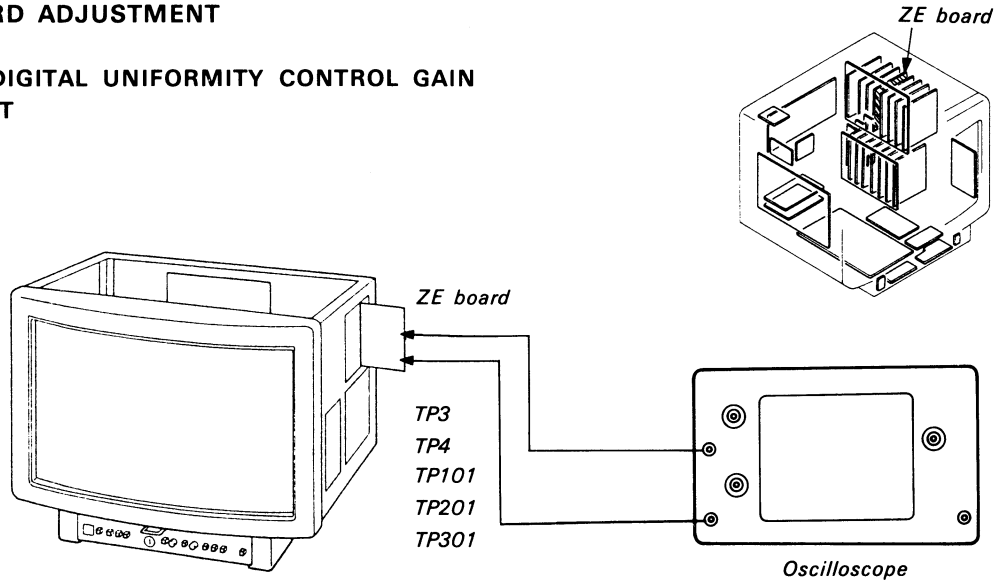


CA board

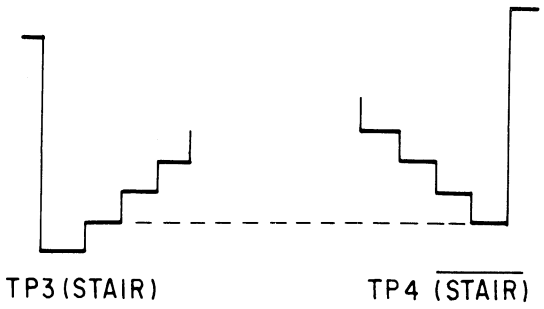


9. ZE BOARD ADJUSTMENT

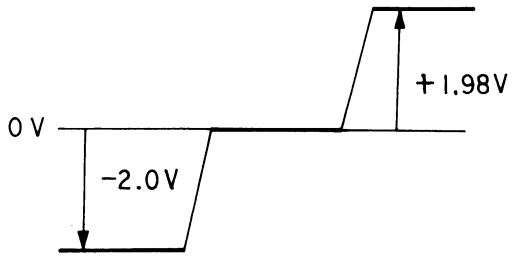
ZE BOARD DIGITAL UNIFORMITY CONTROL GAIN ADJUSTMENT



1. Connect an oscilloscope to STAIR (TP3) and $\overline{\text{STAIR}}$ (TP4) on the ZE board. Adjust OFFSET (RV2) on the ZE board so that the lowest level of $\overline{\text{STAIR}}$ (TP4) becomes the same with the 1st-stage level from the bottom of STAIR (TP3).

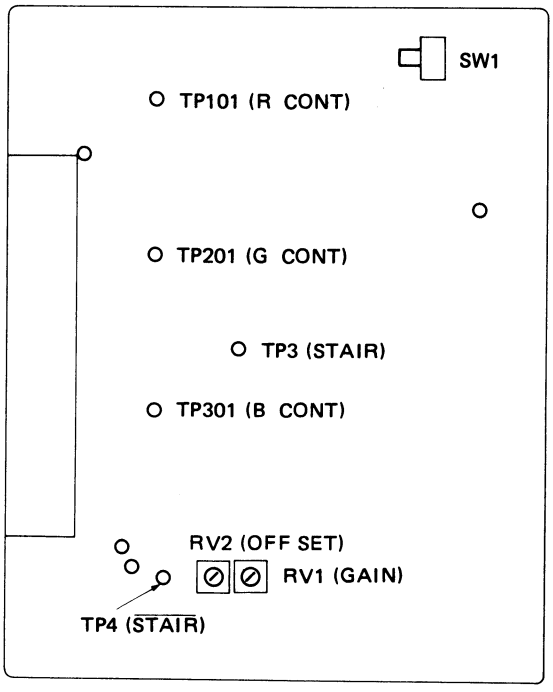


2. Set the position of SW1 to 2 and switch the control to the adjustment signal.
3. Connect an oscilloscope to R-CONT (TP101) on the ZE board, and adjust GAIN (RV1) so that the lowest level becomes −2.0V.



4. For G-CONT (TP201) and B-CONT (TP301) also on the ZE board, be sure the gain is the same as the above.

ZE board

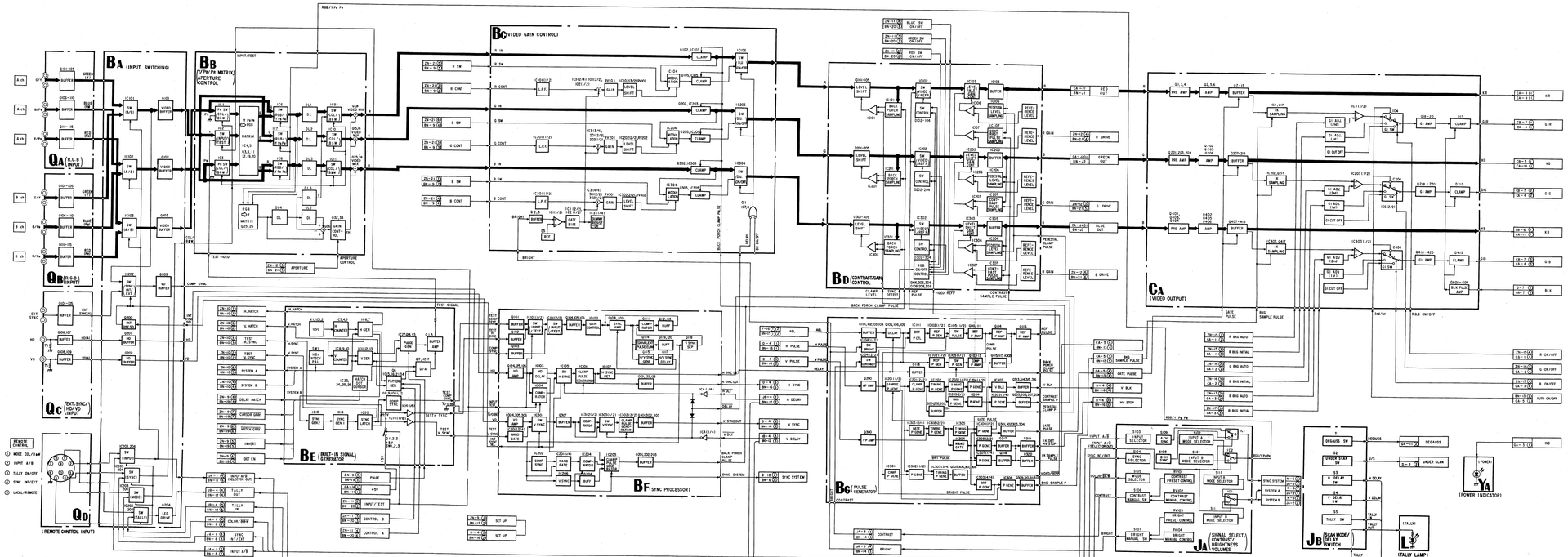


BLOCK DIAGRAMS BLOCK DIAGRAMS

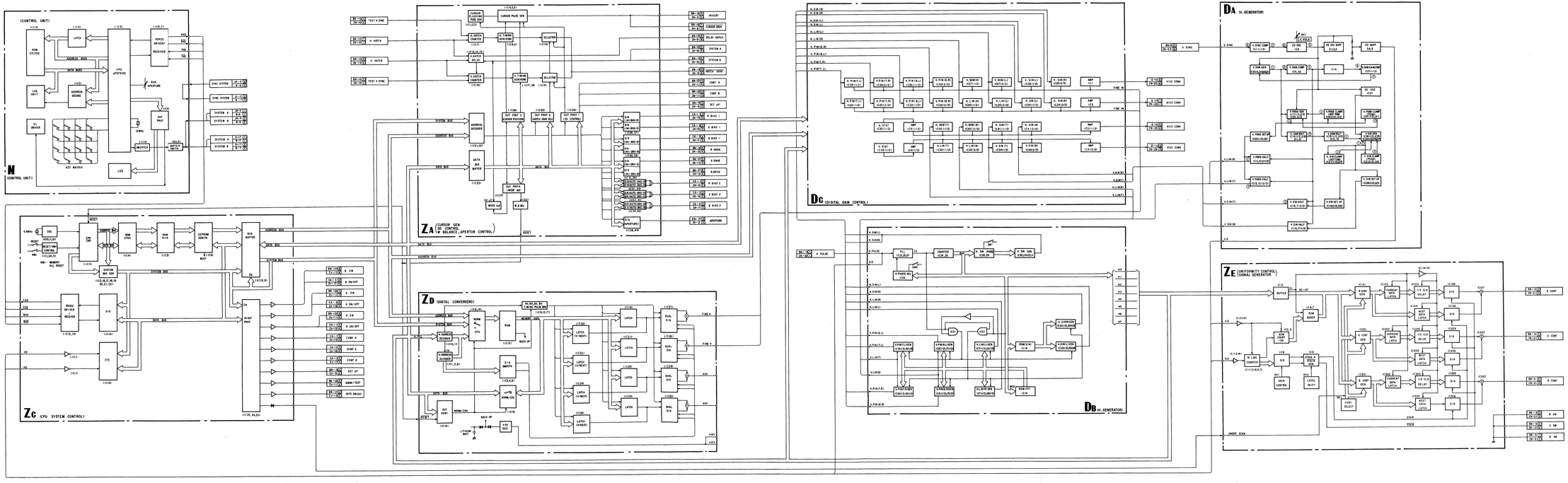
BLOCK DIAGRAMS

SECTION 5
DIAGRAMS

5-1. BLOCK DIAGRAM
SIGNAL PROCESSING BLOCK DIAGRAM

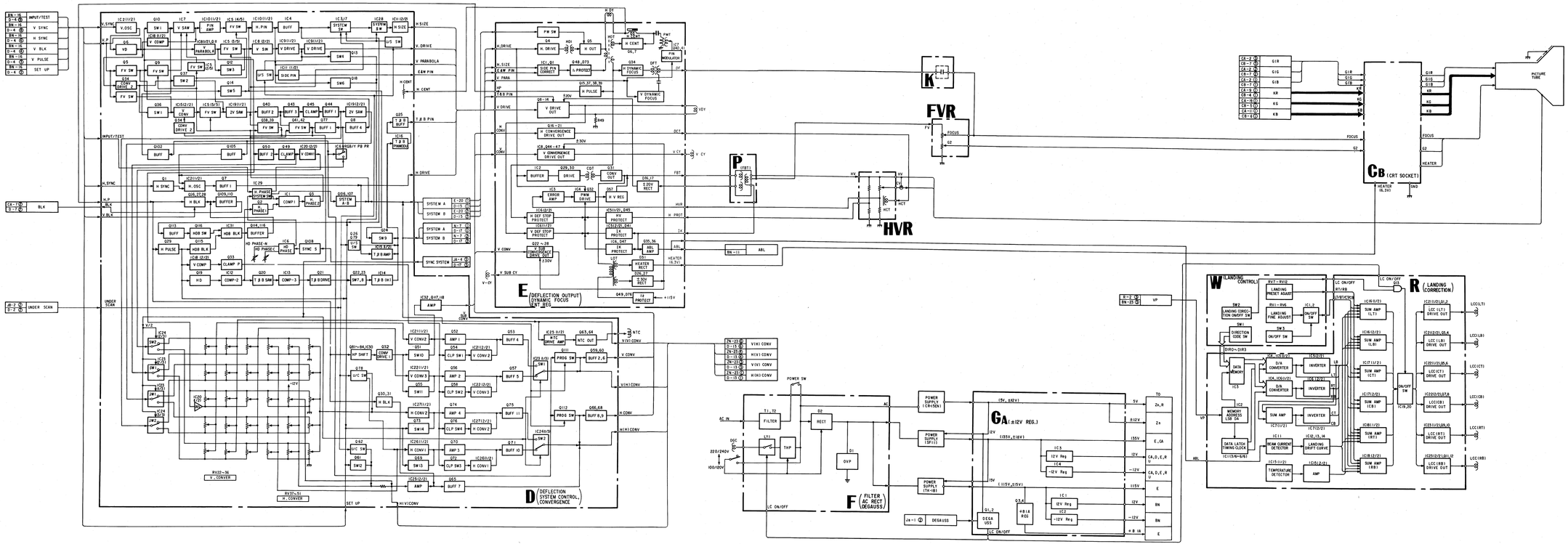


CONTROL PROCESSING BLOCK DIAGRAM



BLOCK DIAGRAMS BLOCK DIAGRAMS

DEFLECTION PROCESSING BLOCK DIAGRAM

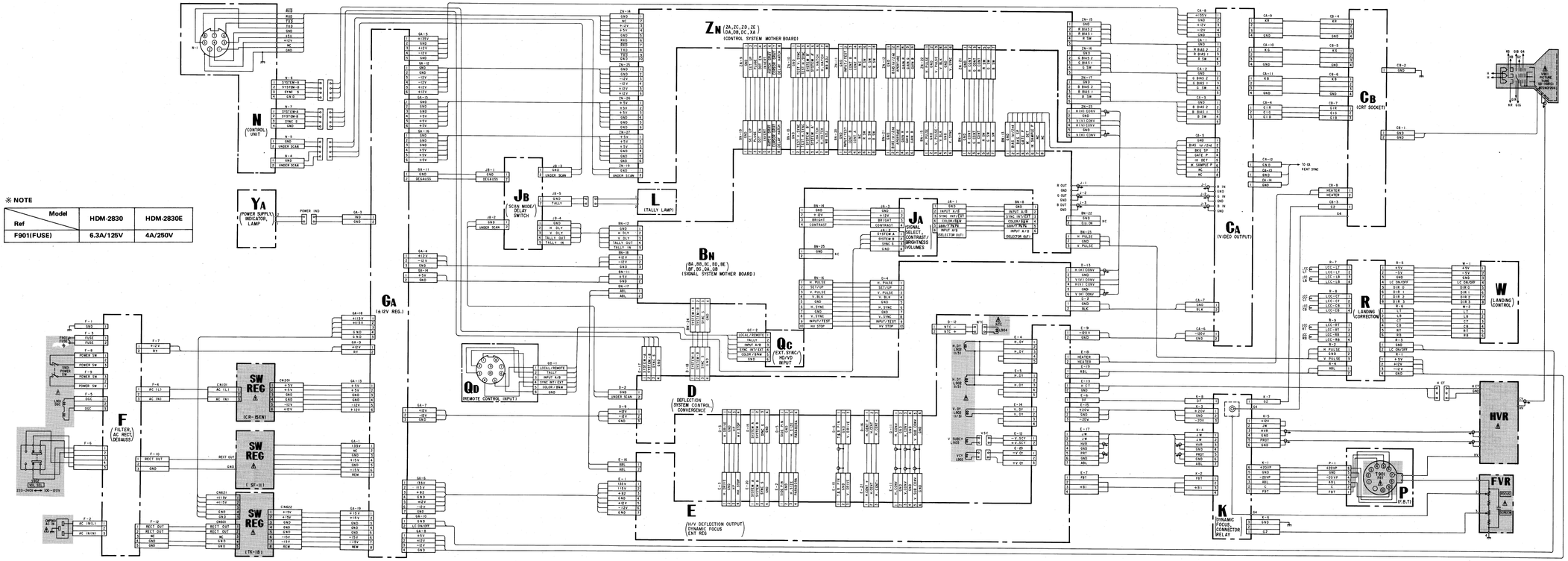


FRAME FRAME

5-2. FRAME WIRING DIAGRAM

※ NOTE

Ref \ Model	HDM-2830	HDM-2830E
F901(FUSE)	6.3A/125V	4A/250V



5-3. MOUNTING AND SCHEMATIC DIAGRAMS

— Conductor Side —

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Note:

- All capacitors are in μF unless otherwise noted. P : μμF 50WV or less are not indicated except for electrolytics.
- All resistor are in ohms, 1/6W on the BC, BD, DA, DB, DC, QA, QB, R, W, ZA, ZD and ZE board and 1/4W on the rest of the boards unless otherwise specified 1/6W, 1% for metal (RN) unless otherwise specified.
- : nonflamable resistor.
- : fusible resistor.
- △ : internal component.
- ▭ : panel designation.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- The components identified by ☒ in this manual have been carefully factory-selected for each set in order to satisfy regulations regarding X-ray radiation. Should replacement be required, replace only with the value originally used.
- When replacing components identified by ◪ mark the necessary adjustments indicated. If results do not meet the specified value, change the component identified by ☒ and repeat the adjustment until the specified value is achieved. (Refer to ☒ D40, ☒ R114, ☒ R115, ☒ R140, ☒ R141, ☒ R183 adjustment on page 4-19~4-22.)
  When replacing the part in below table, be sure to perform the related adjustment.

Part replaced (◪)	Adjustment (☒)
D40, R114, R115, R116, R184, RV2 (E board)	D40, R114, R115 (Page 4-19)
D39, R140, R141, R144, R183 (E board)	R140, R141, R183 (Page 4-19)

Reference information

RESISTOR	: RN	METAL FILM
	: RC	SOLID
	: FPRD	NONFLAMMABLE CARBON
	: FUSE	NONFLAMMABLE FUSIBLE
	: RS	NONFLAMMABLE METAL OXIDE
	: RB	NONFLAMMABLE CEMENT
	: RW	NONFLAMMABLE WIREWOUND
COIL	: LF-8L	MICRO INDUCTOR
CAPACITOR	: TA	TANTALUM
	: PS	STYROL
	: PP	POLYPROPYLENE
	: PT	MYLAR
	: MPS	METALIZED POLYESTER
	: MPP	METALIZED POLYPROPYLENE
	: ALB	BIPOLAR
	: ALT	HIGH TEMPERATURE
	: ALR	HIGH RIPPLE

- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken with a 10MΩ digital multimeter.
- Readings are taken with a color-bar signal input.

BE board

( ): INPUT/TEST selector (N board S14) . . . TEST
MODE switch (N board S10) . . . . INTERNAL TEST SIGNAL
FUNCTION switch (N board S11, S12) . . . . HATCH

BB board

< >: INPUT A mode selector (JA board S102) . . . . Y PB PR

- ✳ : Can not be measured.
- ——— : B + bus.
- – – – : B – bus.
- Voltage variations may be noted due to normal production tolerances.
- ▭ : adjustment for repair.

- Switches and controls are set as tollows unless otherwise noted

FRONT PANEL

1.	INPUT switch	A (⊓)	JA board
2.	SYNC switch	INT (⊓)	
3.	MODE switch	COLOR (⊓)	
4.	CONTRAST MANUAL switch	PRESET (⊓)	
5.	BRIGHTNESS MANUAL switch	PRESET (⊓)	
6.	SCAN MODE V DELAY switch	OFF (⊓)	JB board
7.	SCAN MODE H DELAY switch	OFF (⊓)	
8.	SCAN MODE UNDER switch	OFF (⊓)	

SUB CONTROL PANEL

9.	Control unit	Initial condition	N board
	With the internal signal (at the power on time): TEST MODE		
10.	LANDING ADJ ON/OFF switch (SW2)	ON	W board
11.	LANDING ADJ DIRECTION switch (SW1)	Match to monitor setting direction.	
12.	LANDING FINE ADJ ON/OFF switch (SW3)	OFF	
13.	INPUT A MODE SELECT switch (SW102)	GBR	JA board
14.	INPUT B MODE SELECT switch (SW101)	GBR	
15.	INPUT A H PHASE SELECT switch (SW109)	16:9	
16.	INPUT B H PHASE SELECT switch (SW108)	16:9	
17.	INPUT A SYSTEM SELECT switch (SW113)	HDTV A	
18.	INPUT B SYSTEM SELECT switch (SW110)	HDTV A	

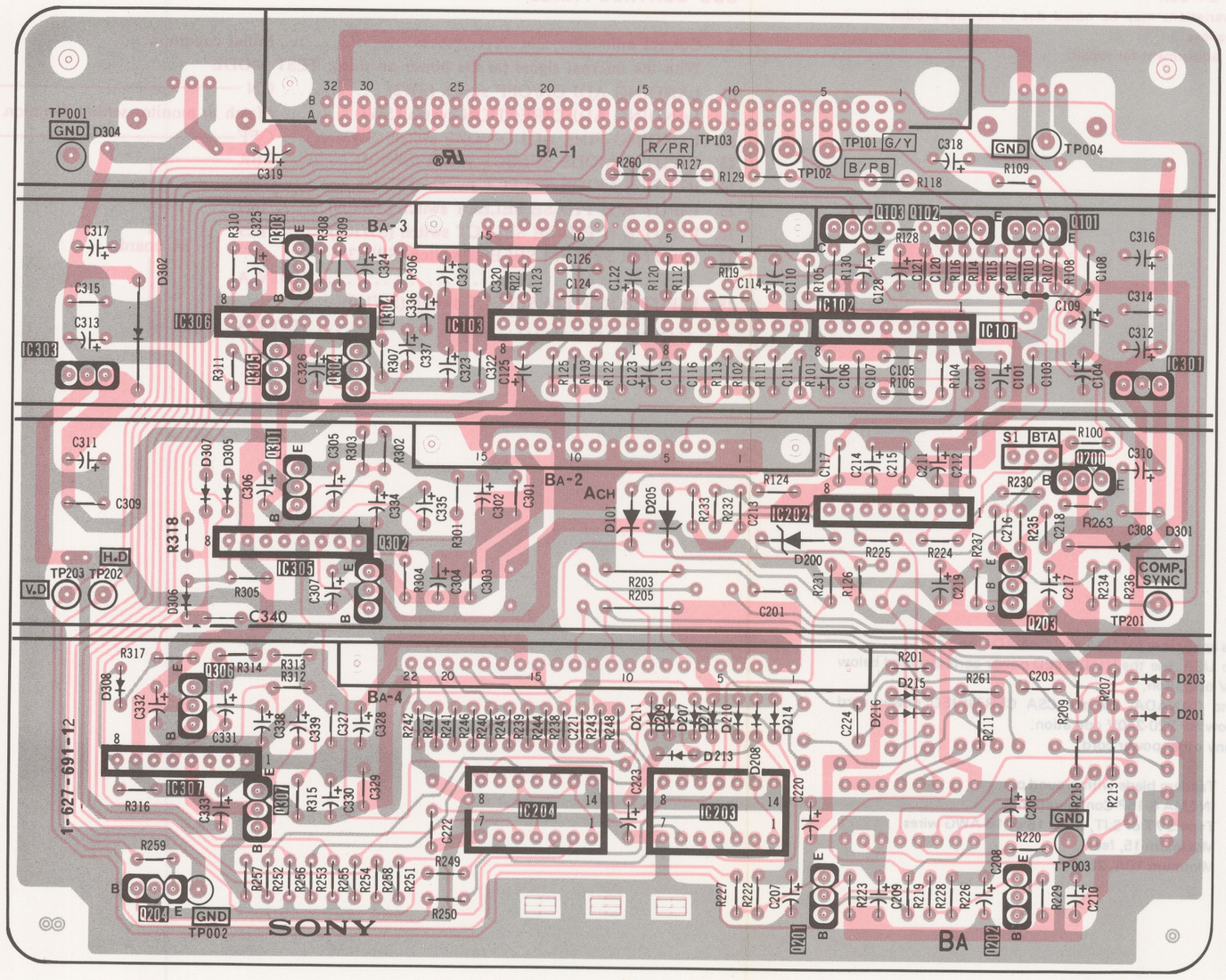
NOTICE

This notice is applicable for USA and CANADA only.
If shipped to USA, use the UL LISTED power cord specified below for 220-240V operation.
If shipped to CANADA, use the CSA CERTIFIED power cord specified below for 220-240V operation.
Do not use any other power cord.

Plug Cap	Tandem blade with ground pin. (NEMA 6-15P Configuration)
Cord	Type SVT or SJT, three 16 or 18 AWG wires.
Length	Maximum 15, feet
Rating	Minimum 10A, 250V

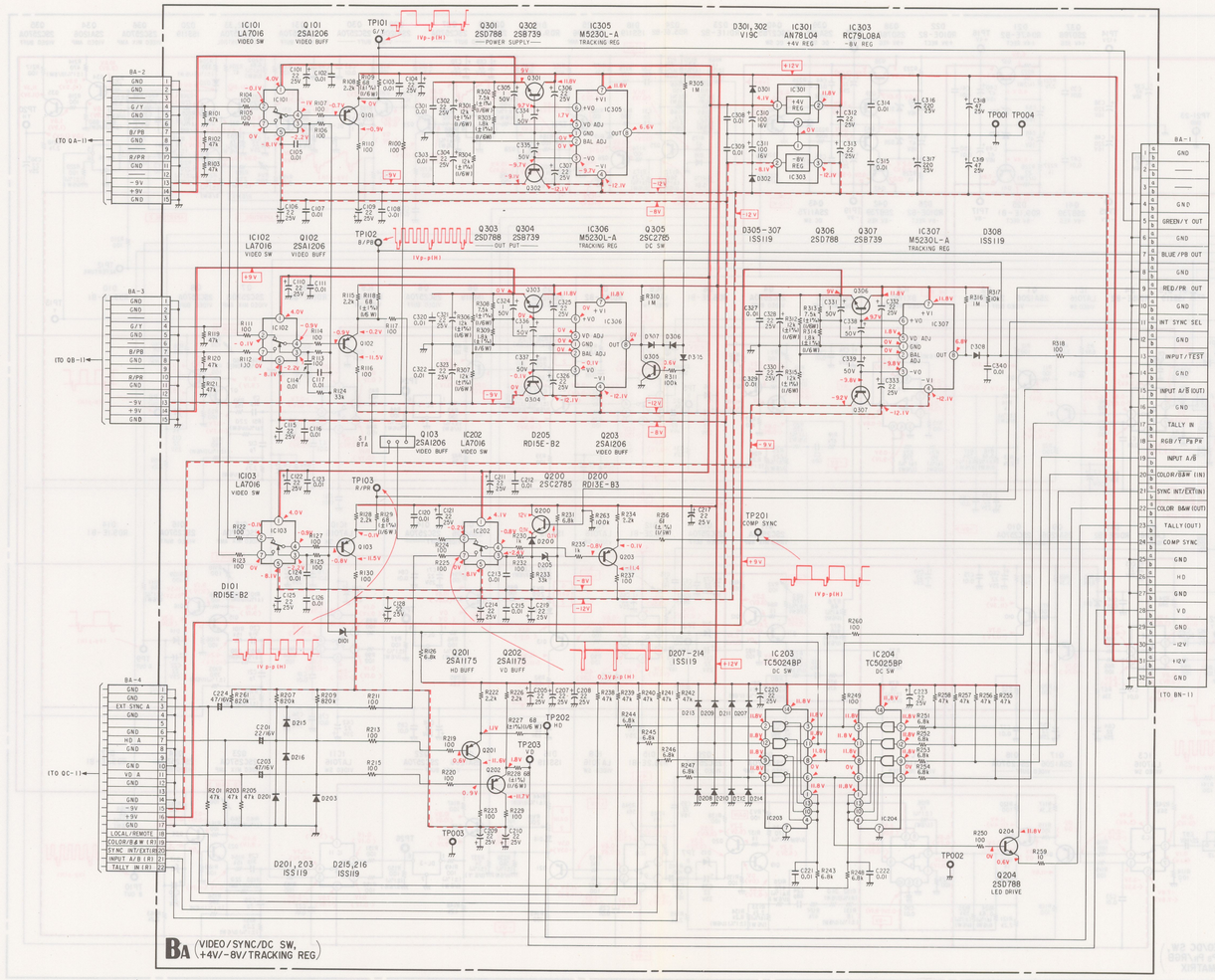
BA board (INPUT SWITCHING)

IC	303 306 305 307 103 102 204 203 101 202 301
Q	303 305 304 301 302 306 204 307 103 102 101 200 203 201 202
D	302 308 307,305 306 101, 205 209 207 210 214 211 213 212 208 200 215 216 203 301,201
TP	TP001,202 TP103,102,101 TP004 TP201 TP003



- ■: Conductor side pattern
- ■: Component side pattern

BA board (INPUT SWITCHING)



BA board

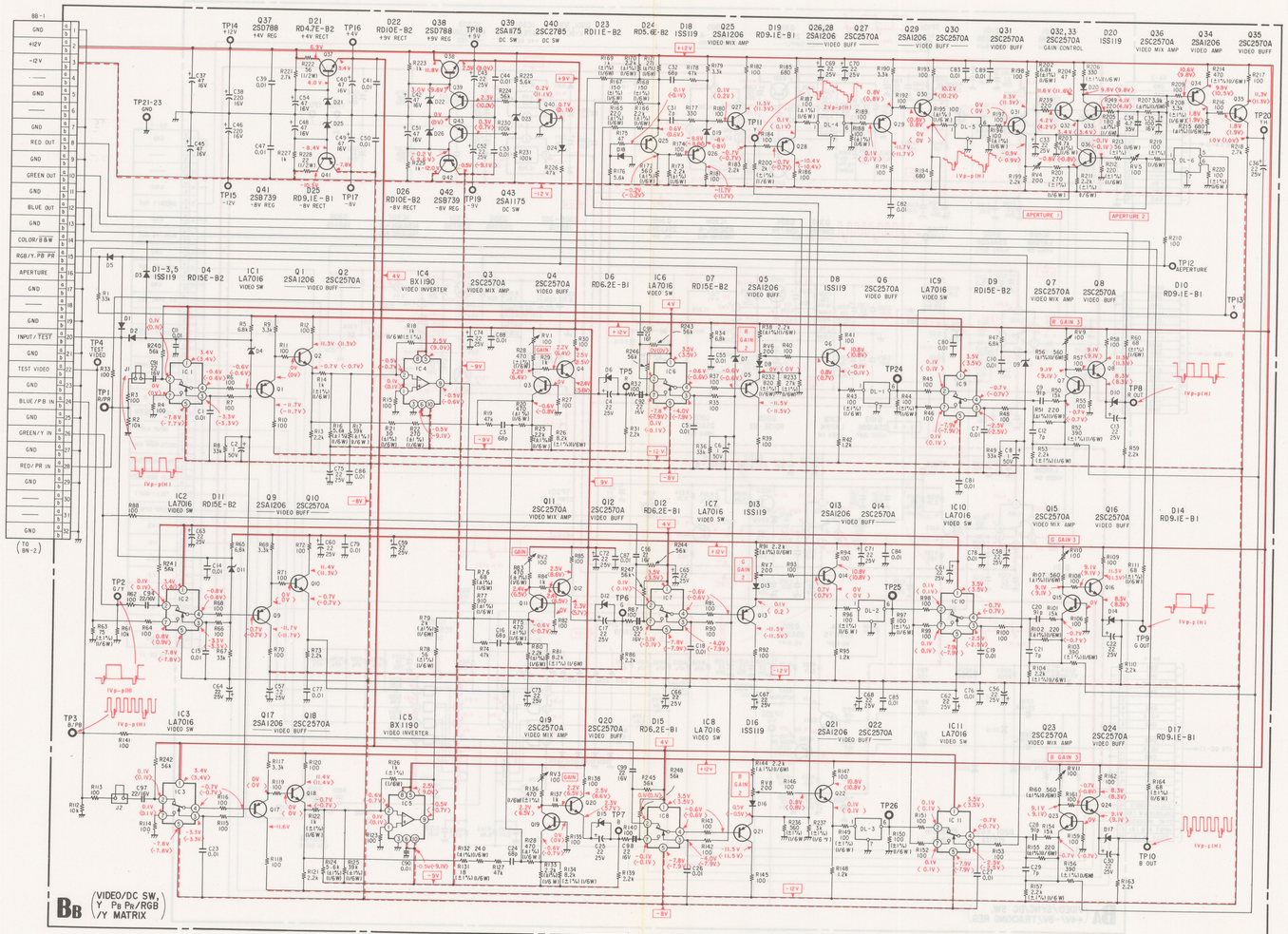
IC101	LA7016	VIDEO SW
102	LA7016	VIDEO SW
103	LA7016	VIDEO SW
202	LA7016	VIDEO SW
203	TC5024BP	DC SW
204	TC5025BP	DC SW
301	AN78L04	+4V REG
303	RC79L08A	-8V REG
305	M5230L-A	TRACKING REG
306	M5230L-A	TRACKING REG
307	M5230L-A	TRACKING REG
Q101	2SA1206	VIDEO BUFF
102	2SA1206	VIDEO BUFF
103	2SA1206	VIDEO BUFF
Q200	2SC2785	
201	2SA1175	HD BUFF
202	2SA1175	VD BUFF
203	2SA1206	VIDEO BUFF
204	2SD788	LED DRIVE
301	2SD788	POWER SUPPLY
302	2SB739	POWER SUPPLY
303	2SD788	OUTPUT
304	2SB739	OUTPUT
305	2SC2785	DC SW
306	2SD788	
307	2SB739	
D101	RD15EB2	
D200	RD13EB3	
201	1SS119	
203	1SS119	
205	RD15EB2	
207	1SS119	
208	1SS119	
209	1SS119	
210	1SS119	
211	1SS119	
212	1SS119	
213	1SS119	
214	1SS119	
215	1SS119	
216	1SS119	
301	V19C	
302	V19C	
305	1SS119	
306	1SS119	
307	1SS119	
308	1SS119	

BB board

IC1	LA7016	VIDEO SW
2	LA7016	VIDEO SW
3	LA7016	VIDEO SW
4	BX-1190	VIDEO INVERTER
5	BX-1190	VIDEO INVERTER
6	LA7016	VIDEO SW
7	LA7016	VIDEO SW
8	LA7016	VIDEO SW
9	LA7016	VIDEO SW
10	LA7016	VIDEO SW
11	LA7016	VIDEO SW
Q1	2SA1206	VIDEO BUFF
2	2SC2570A	VIDEO BUFF
3	2SC2570A	VIDEO MIX AMP
4	2SC2570A	VIDEO BUFF
5	2SA1206	VIDEO BUFF
6	2SC2570A	VIDEO BUFF
7	2SC2570A	VIDEO MIX AMP
8	2SC2570A	VIDEO BUFF
9	2SA1206	VIDEO BUFF
10	2SC2570A	VIDEO BUFF
11	2SC2570A	VIDEO MIX AMP
12	2SC2570A	VIDEO BUFF
13	2SA1206	VIDEO BUFF
14	2SC2570A	VIDEO BUFF
15	2SC2570A	VIDEO MIX AMP
16	2SC2570A	VIDEO BUFF
17	2SA1206	VIDEO BUFF
18	2SC2570A	VIDEO BUFF
19	2SC2570A	VIDEO MIX AMP
20	2SC2570A	VIDEO BUFF
21	2SA1206	VIDEO BUFF
22	2SC2570A	VIDEO BUFF
23	2SC2570A	VIDEO MIX AMP
24	2SC2570A	VIDEO BUFF
25	2SA1206	VIDEO MIX AMP
26	2SA1206	VIDEO BUFF
27	2SC2570A	VIDEO BUFF
28	2SA1206	VIDEO BUFF
29	2SA1206	VIDEO BUFF

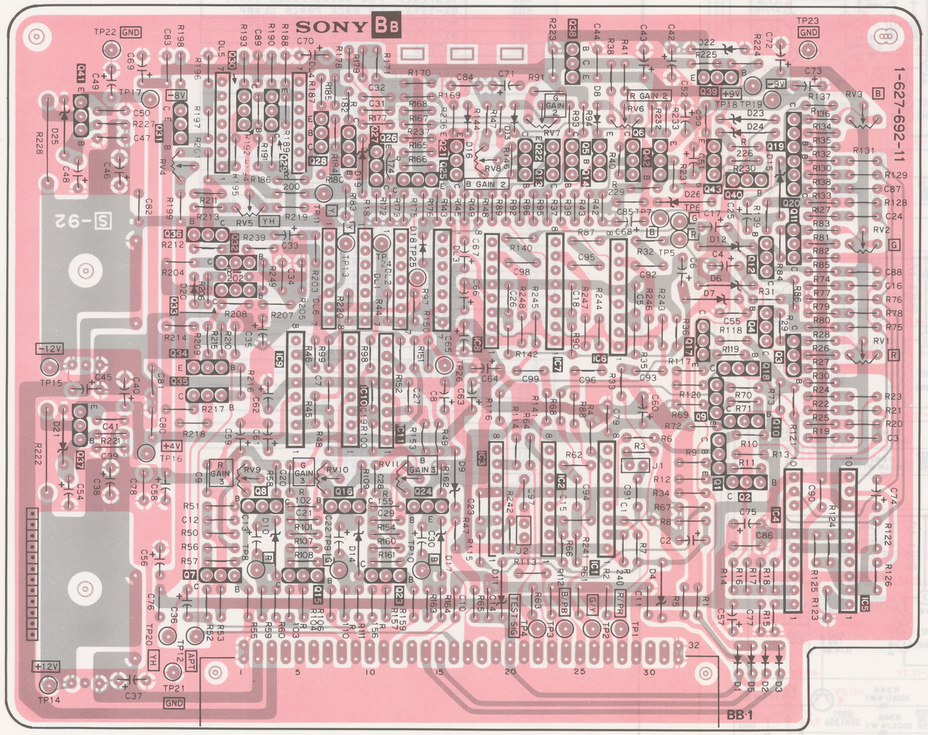
Q30	2SC2570A	VIDEO BUFF
31	2SC2570A	VIDEO BUFF
32	2SC2570A	GAIN CONTROL
33	2SC2570A	GAIN CONTROL
34	2SA1206	VIDEO AMP
35	2SC2570A	VIDEO BUFF
36	2SC2570A	VIDEO MIX AMP
37	2SD788	+4V REG
38	2SD788	+9V REG
39	2SA1175	DC SW
40	2SC2785	DC SW
41	2SB739	-8V REG
42	2SB739	-9V REG
43	2SA1175	DC SW
D1	1SS119	
2	1SS119	
3	1SS119	
4	RD15EB2	
5	1SS119	
6	RD6.2EB1	
7	RD15EB2	
8	1SS119	
9	RD15EB2	
10	RD9.1EB1	
11	RD15EB2	
12	RD6.2EB1	
13	1SS119	
14	RD9.1EB1	
15	RD6.2EB1	
16	1SS119	
17	RD9.1EB1	
18	1SS119	
19	RD9.1EB1	
20	1SS119	
21	RD4.7EB2	+4V REG
22	RD10EB2	+9V REG
23	RD11EB2	
24	RD5.6EB2	
25	RD9.1EB1	-8V REG
26	RD10EB2	-8V REG

BB board (YPBPR MATRIX, APERTURE CONTROL)



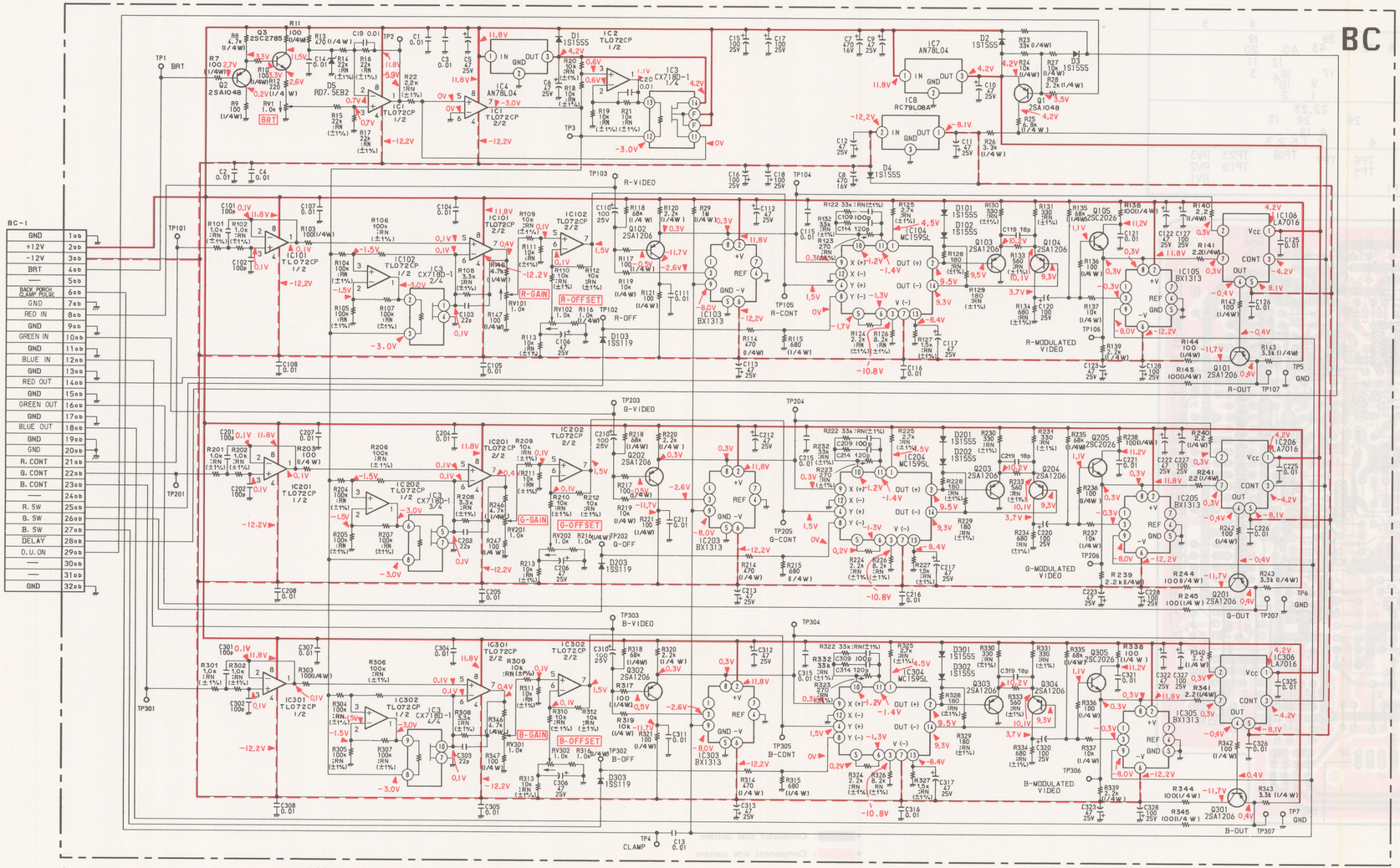
BB board (YPBPR MATRIX, APERTURE CONTROL)

IC	8 7 6 9 10 11 3 2 1 4 5
Q	41 38 39 19 31 30 29 28 27 26 25 21 22,13,5 14 6 42 43 40 20 36 32 12 11 34 33 17 18 4 3 37 35 9 10 7 8 15 16 23 24 1 2
D	19 16 13 8 22,23 25 20 26 24 15 21 18 6 12 10 14 17 9 11 4 7 1 5 2 3
ADJ	TP17 TP6 TP7 TP18 TP23 RV3
TP	TP22 TP16 RV4 RV5 TP11,TP13 TP5 TP19 RV2 TP15 TP20 TP12 TP8 TP9 TP10 RV1 TP14 TP21 TP4,TP3,TP2,TP1



● : Conductor side pattern
● : Component side pattern

BC board (DIGITAL UNIFORMITY)

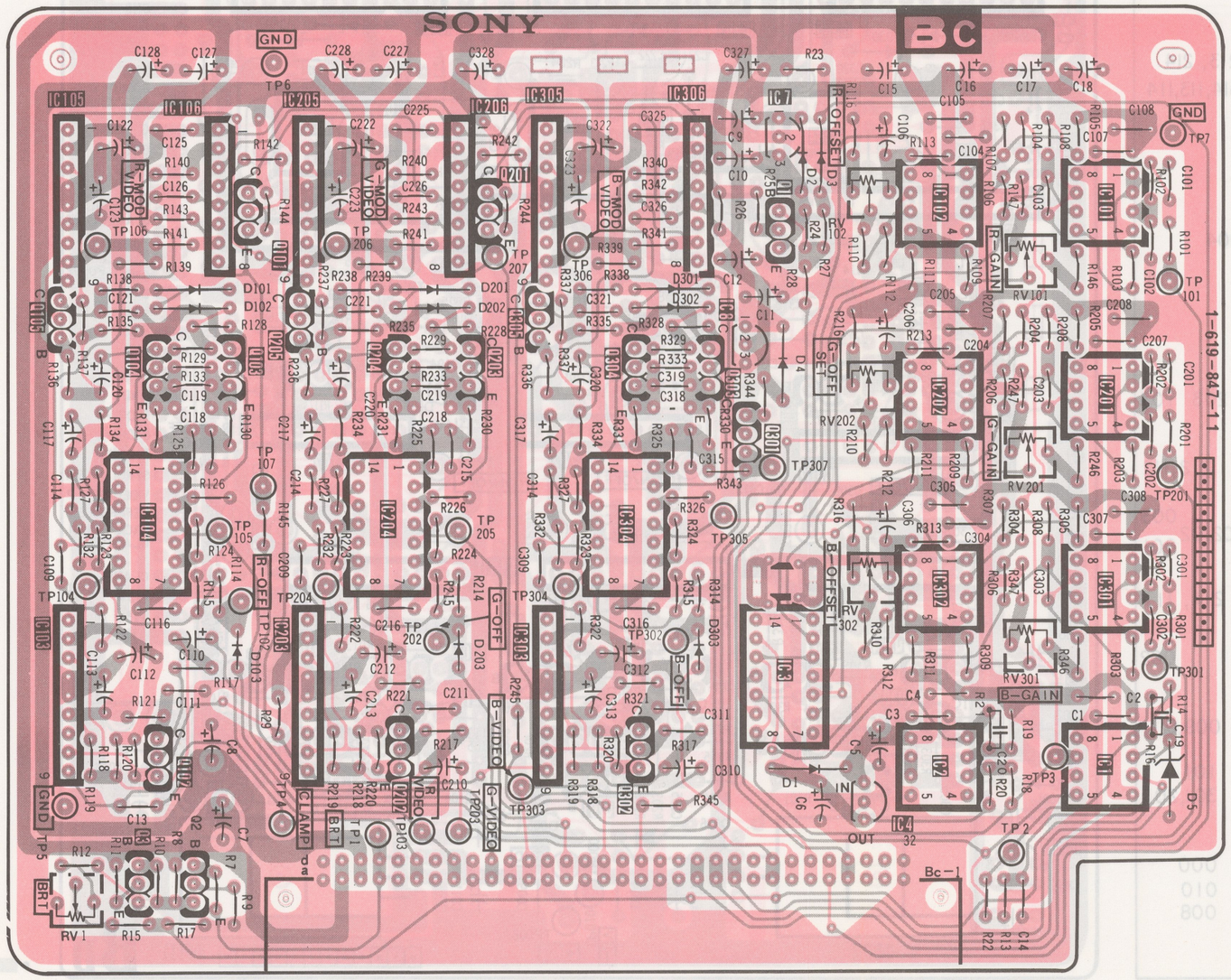


BC board

IC1	TL072ACP	BRIGTH LEVEL SHIFT
2	TL072ACP	LINEARIZE
3	CX-718D	CONT SIG ATT
4	AN78L04	+4V REG
7	AN78L04	+4V REG
8	NJM79L08A	-8V REG
101	TL072ACP	LPF/R CONT ATT
102	TL072ACP	GD DRIVE/LEVEL SHIFT
103	BX-1313	R BACK PORCH CLAMP
104	MC1595L	R VIDEO MODULATION
105	BX-1313	R BACK PORCH CLAMP
106	LA7016	R VIDEO SW
201	TL072ACP	LPF/G CONT ATT
202	TL072ACP	GD DRIVE/LEVEL SHIFT
203	BX-1313	G BACK PORCH CLAMP
204	MC1595L	G VIDEO MODULATION
205	BX-1313	G BACK PORCH CLAMP
206	LA7016	G VIDEO SW
301	TL072ACP	LPF/B CONT ATT
302	TL072ACP	GD DRIVE/LEVEL SHIFT
303	BX-1313	B BACK PORCH CLAMP
304	MC1595L	B VIDEO MODULATION
305	BX-1313	B BACK PORCH CLAMP
306	LA7016	B VIDEO SW
Q1	2SA1048TP	DU SW
2	2SA1048TP	BRIGHT BUFF
3	2SC2785TP	BRIGHT BUFF
101	2SA1206	R VIDEO BUFF
102	2SA1206	R VIDEO BUFF
103	2SA1206	R MODULATED VIDEO AMP
104	2SA1206	R MODULATED VIDEO AMP
105	2SC2026	R MODULATED VIDEO BUFF
201	2SA1206	G VIDEO BUFF
202	2SA1206	G VIDEO BUFF
203	2SA1206	G MODULATED VIDEO AMP
204	2SA1206	G MODULATED VIDEO AMP
205	2SC2026	G MODULATED VIDEO BUFF
301	2SA1206	B VIDEO BUFF
302	2SA1206	B VIDEO BUFF
303	2SA1206	B MODULATED VIDEO AMP
304	2SA1206	B MODULATED VIDEO AMP
305	2SC2026	B MODULATED VIDEO BUFF
D1	1S1555	REG PROT
2	1S1555	REG PROT
3	1S1555	SW GATE
4	1S1555	REG PROT
5	RD7.5EB2	+7.5V REG
101	1S1555	BIAS
102	1S1555	BIAS
103	1SS119	VIDEO OFF
201	1S1555	BIAS
202	1S1555	BIAS
203	1SS119	VIDEO OFF
301	1S1555	BIAS
302	1S1555	BIAS
303	1SS119	VIDEO OFF

BC board (DIGITAL UNIFORMITY)

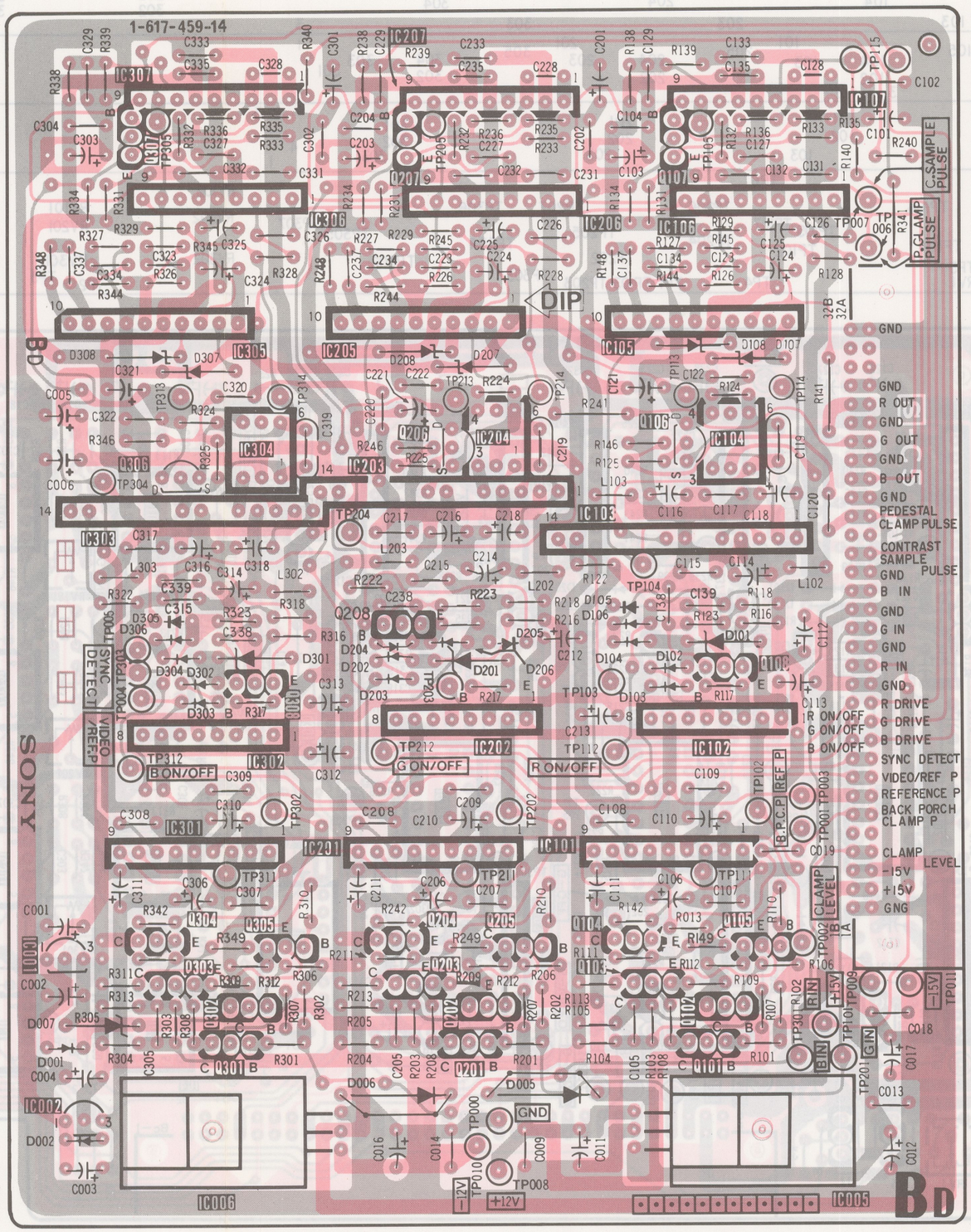
IC	105 106 205 206 305 306 7 102 101 104 204 304 8 202 201 103 203 303 3 4 2 302 301 1
Q	105 101 205 204 201 305 1 304 303 104 103 203 202 302 301 102 3 2
D	101 201 301 2 3 102 202 302 4 103 203 303 1 5
ADJ・TP	TP6 RV102 TP7 TP106 TP206 TP207 TP306 RV202 RV101 TP101 TP105 TP107 TP205 TP305 TP307 RV201 TP201 TP104 TP204 TP304 TP102 TP202 TP302 RV302 RV301 TP5 TP303 TP301 RV1 TP4 TP1 TP103 TP203 TP2 TP3



: Conductor side pattern
: Component side pattern

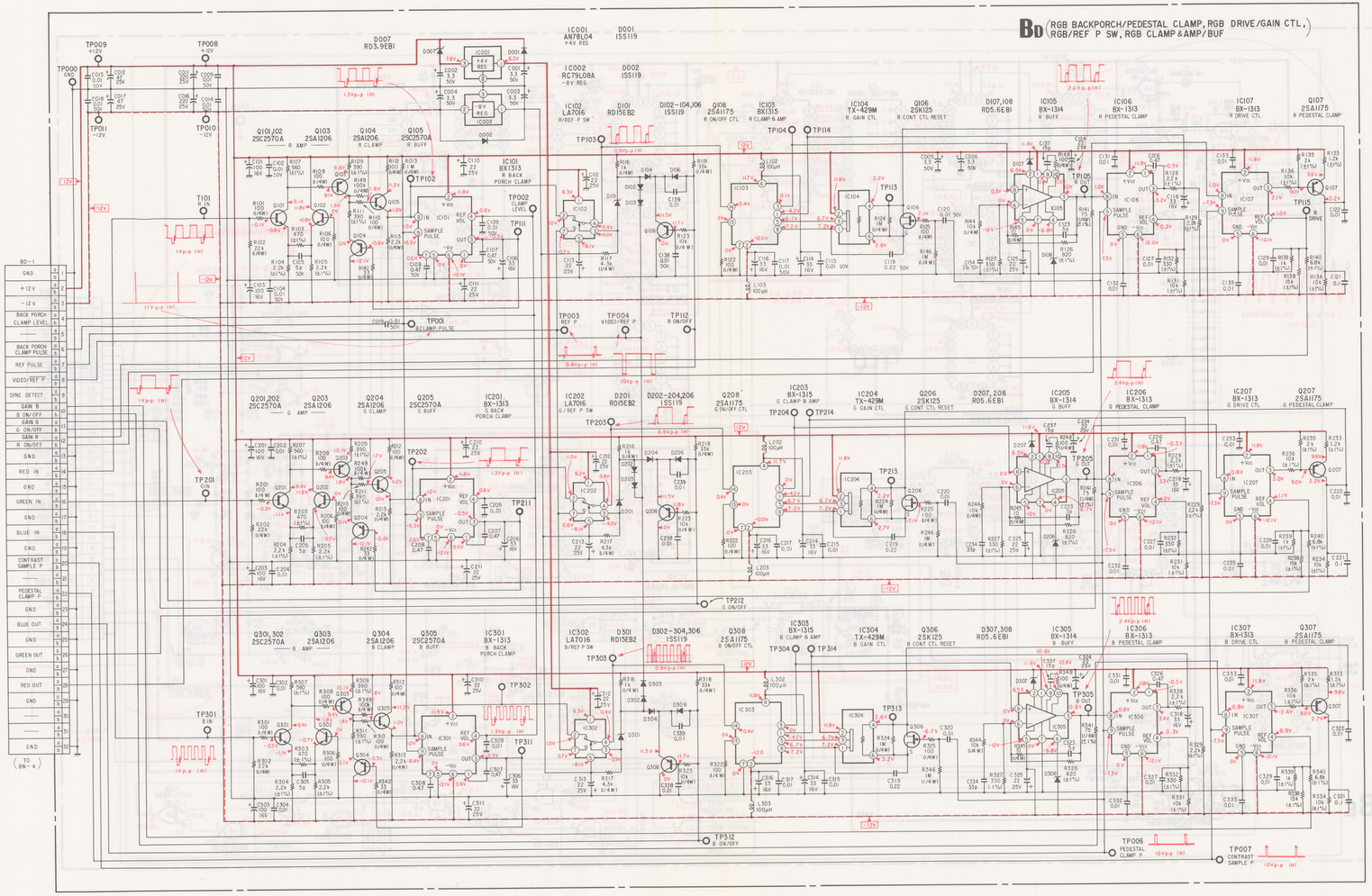
BD board (CONTRAST/GAIN CONTROL)

IC	Q	D	TP
			115
307 207 107			305 205 105
	307 207 107		
306 206 106			007
			006
305 205 105			
		308 208 108	213, 214
		307 207 107	313, 314,113,114
304 204 104	206, 106		
203	306		304
303			
103			204
			104
	208	204,106	
		306,202,104 101	
		304, 301, 201	
	308 108	302 102	303
		303,203 103	004 203 103
		206	
202 102			
302			212,112
			312
			003
			302,202,102 001
301 201 101			
			311, 211, 111
	204,205		002
	304,305,104,105		
001			
	303 203 103		009,011
	302,202,102	007	101
	301, 201,101	001	301,201
002			000
		002	010
			008



: Conductor side pattern
: Component side pattern

BD board (CONTRAST/GAIN CONTROL)



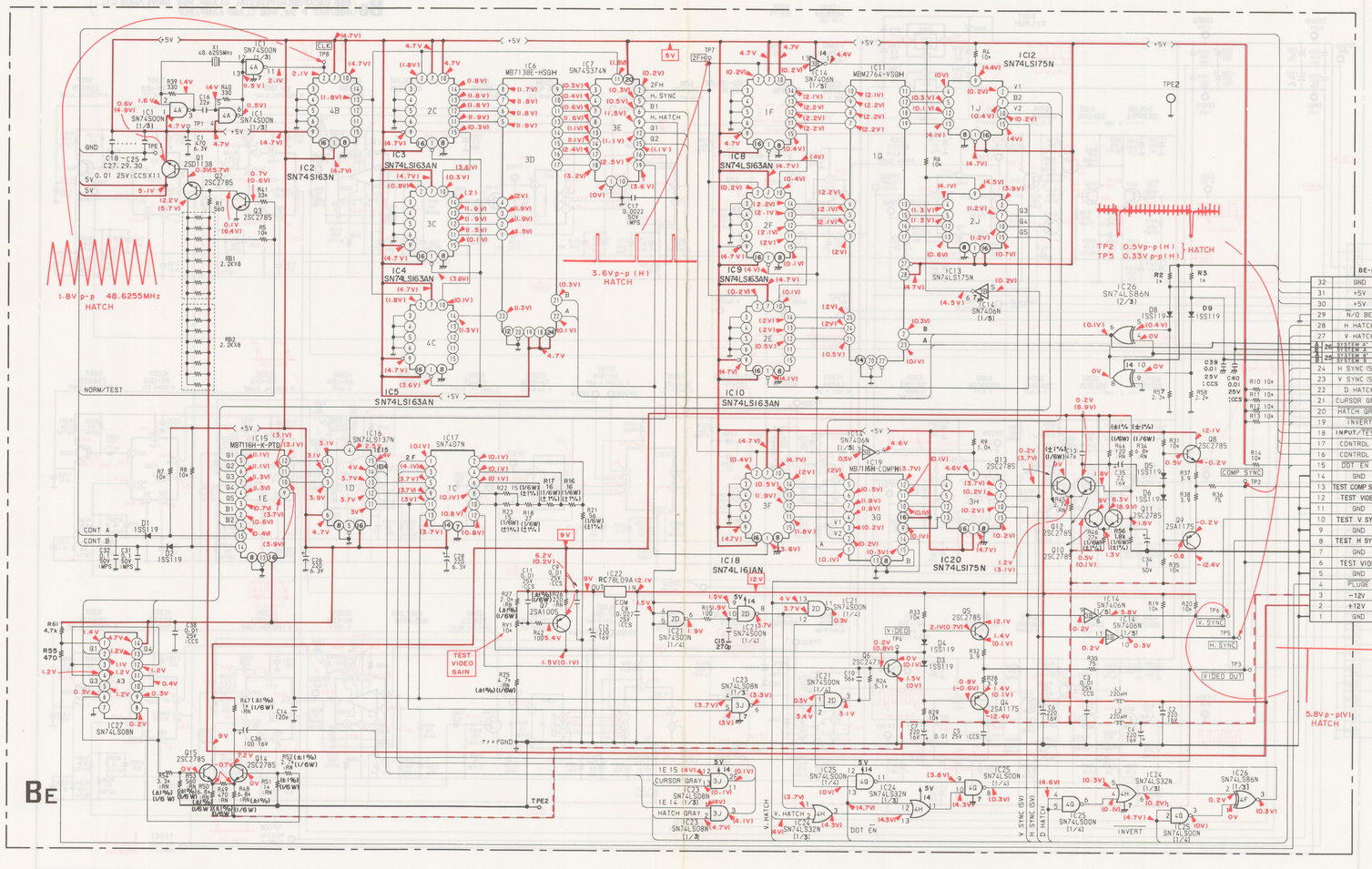
BD board

IC001	AN78L04	+4V REG
002	RC79L08A	-8V REG
101	BX-1313	R BACKPORCH CLAMP
102	LA7016	R/REF P SW
103	BX-1315	R CLAMP & AMP
104	TX-429M	R GAIN CTL
105	BX-1314	R BUFF
106	BX-1313	R PEDESTAL CLAMP
107	BX-1313	R DRIVE CTL
201	BX-1313	G BACKPORCH CLAMP
202	LA7016	G/REF P SW
203	BX-1315	G CLAMP & AMP
204	TX-429M	G GAIN CTL
205	BX-1314	G BUFF
206	BX-1313	G PEDESTAL CLAMP
207	BX-1313	G DRIVE CTL
301	BX-1313	B BACKPORCH CLAMP
302	LA7016	B/REF P SW
303	BX-1315	B CLAMP & AMP
304	TX-429M	B GAIN CTL
305	BX-1314	B BUFF
306	BX-1313	B PEDESTAL CLAMP
307	BX-1313	B DRIVE CTL
Q101	2SC2570A	R AMP
102	2SC2570A	R AMP
103	2SA1206	R AMP
104	2SA1206	R CLAMP
105	2SC2570A	R BUFF
106	2SK125	R CONT CTL RESET
107	2SA1175	R PEDESTAL CLAMP
108	2SA1175	R ON/OFF CTL
201	2SC2570A	G AMP
202	2SC2570A	G AMP
203	2SA1206	G AMP
204	2SA1206	G CLAMP
205	2SC2570A	G CLAMP
206	2SK125	G CONT CTL RESET
Q207	2SA1175	G PEDESTAL CLAMP
208	2SA1175	G ON/OFF CTL
301	2SC2570A	B AMP
302	2SC2570A	B AMP
303	2SA1206	B AMP
304	2SA1206	B CLAMP
305	2SC2570A	B CLAMP
306	2SK125	B CONT CTL RESET
307	2SA1175	B PEDESTAL CLAMP
308	2SA1175	B ON/OF CTL
D001	1SS119	
002	1SS119	
007	RD3.9EB1	
101	RD15EB2	
102	1SS119	
103	1SS119	
104	1SS119	
106	1SS119	
107	RD5.6EB1	
108	RD5.6EB1	
201	RD15EB2	
202	1SS119	
203	1SS119	
204	1SS119	
206	1SS119	
207	RD5.6EB1	
208	RD5.6EB1	
301	RD15EB2	
302	1SS119	
303	1SS119	
304	1SS119	
306	1SS119	
307	RD5.6EB1	
308	RD5.6EB1	

BE board

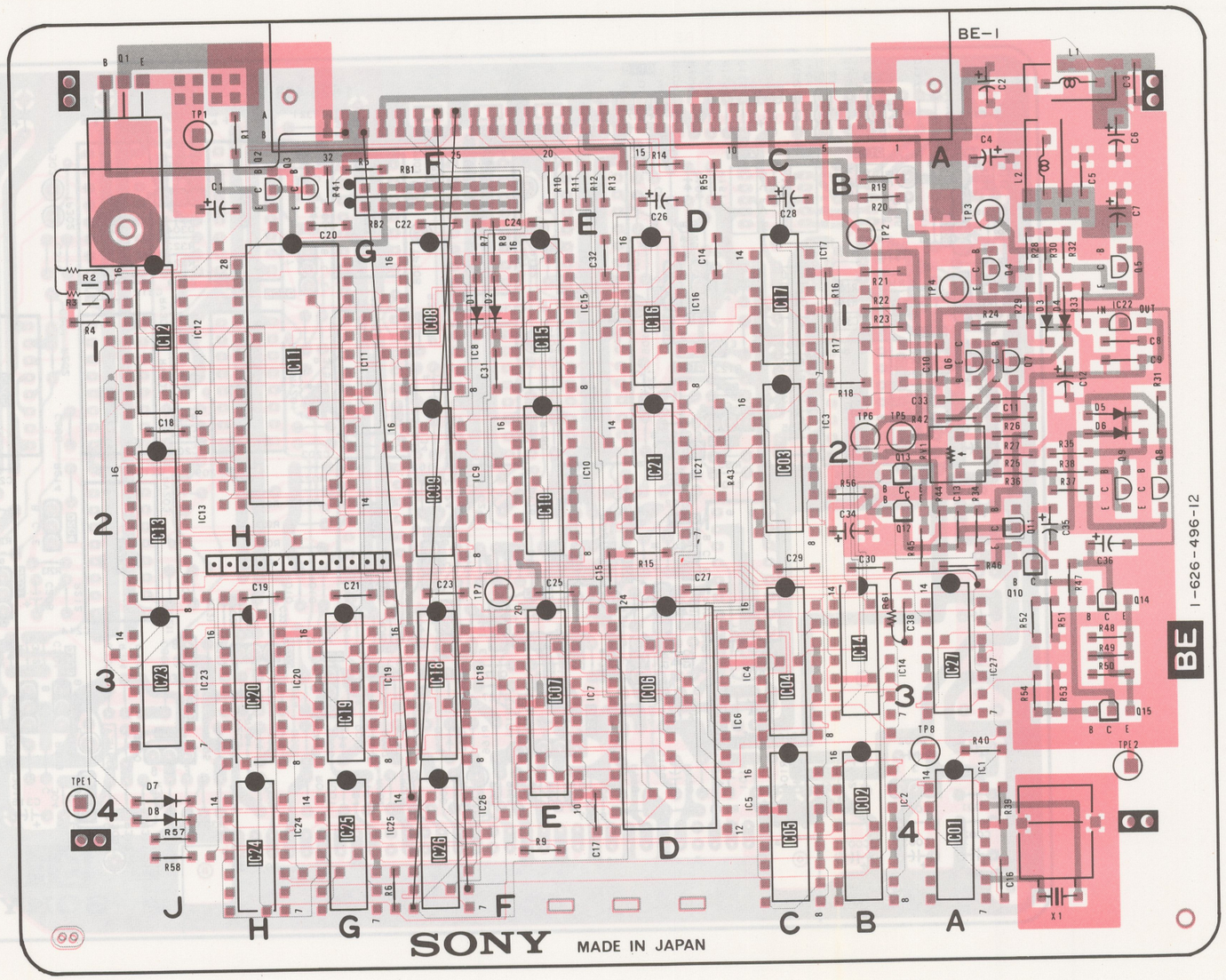
IC1	SN74S00N	OSC
2	SN74S163N	DIVIDER
3	SN74LS163AN	ADDRESS ENCODE 1
4	SN74LS163AN	ADDRESS ENCODE 2
5	SN74LS163AN	ADDRESS ENCODE 3
6	MB7138E-HSGH	H PULSE GEN
7	SN74S374N	H PULSE LATCH
8	SN74LS163AN	ADDRESS ENCODE 4
9	SN74LS163AN	ADDRESS ENCODE 5
10	SN74LS163AN	ADDRESS ENCODE 6
11	MBM2764-VSGH	V PULSE GEN
12	SN74LS175N	V PULSE LATCH 1
13	SN74LS175N	V PULSE LATCH 2
14	SN7406N	OUTPUT BUFF
15	MB7116H-K-PTD	PATTERN ENCODE
16	SN74LS137N	PATTERN ENCODE
17	SN7407N	LEVEL SELECT
18	SN74LS161AN	SYNC GEN 2
19	MB7116H-K-COMPH	SYNC GEN 1
20	SN74LS175N	SYNC LATCH
21	SN74S00N	PULSE GEN
22	RC78L09A	+9V REG
23	SN74LS08N	CONTROL PULSE GEN 1
24	SN74LS32N	CONTROL PULSE GEN 2
25	SN74LS00N	CONTROL PULSE GEN 3
26	SN74LS86N	CONTROL PULSE GEN 4
27	SN74LS08N	PULGE GEN
Q1	2SD1138	+5V SW1
2	2SC2785	+5V SW2
3	2SC2785	+5V SW3
4	2SA1175	BUFF 3
5	2SC2785	BUFF 1
6	2SC2471	HATCH GEN
7	2SA1005	CURRENT SOURCE
8	2SC2785	BUFF 2
9	2SA1175	BUFF 4
10	2SC2785	SYNC GEN 1
11	2SC2785	SYNC GEN 2
12	2SC2785	SYNC GEN 3
13	2SC2785	SYNC GEN 4
14	2SC2785	PULGE GEN 1
15	2SC2785	PULGE GEN 2
D1	1SS119	PROTECT 1
2	1SS119	PROTECT 2
3	1SS119	BIAS 1
4	1SS119	BIAS 2
5	1SS119	BIAS 3
6	1SS119	BIAS 4
7	1SS119	LEVEL SHIFT 1
8	1SS119	LEVEL SHIFT 2
9	1SS119	LEVEL SHIFT 3

BE board (BUILT-IN SIGNAL GENERATOR)



BE board (BUILT-IN SIGNAL GENERATOR)

IC Q	1 IC12 IC13 IC23 2 3 IC11 IC20 IC24 IC19 IC25 IC8 IC9 IC18 IC26 IC15 IC10 IC7 IC16 IC21 IC6 IC17 IC3 IC4 IC5 4 13 12 6 7 IC14 IC2 IC27 IC1 11 10 5 IC22 9 8 14 15
D	1 2 9 8 3 4 5 6
ADJ TP	TP1 TP7 TP2 TP4 TP3 TP6 TP5 RV1 TP8 TPE1 TPE2



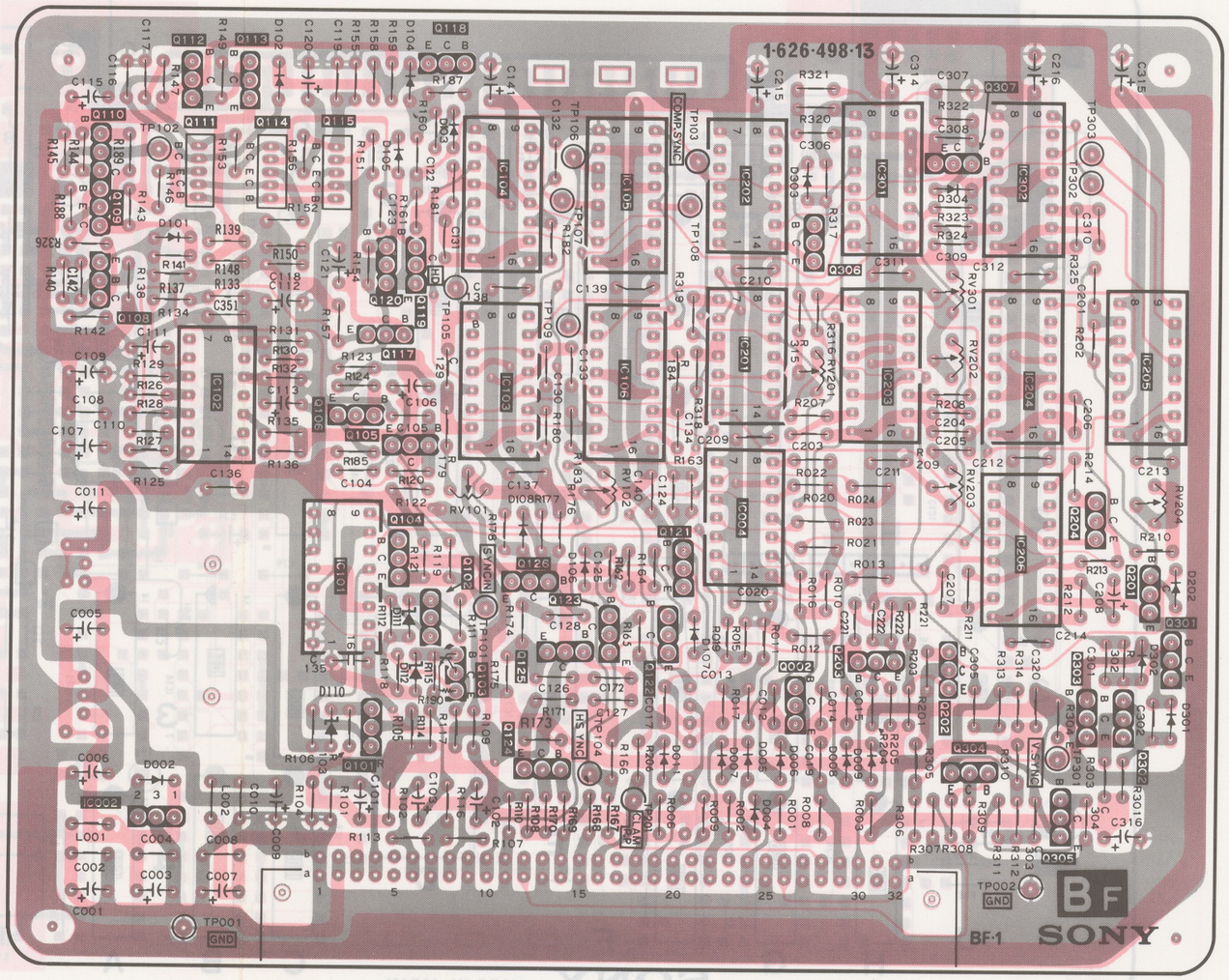
● : Conductor side pattern
● : Component side pattern

BF board

IC2	UPC78L05J	5V REG
4	SN74HC05N	INVERTER
101	TC4053BP	INPUT/TEST SW
102	MC1496P	GAIN CONTROL
103	TC74HC4538P	HD DELAY
104	TC74HC4538P	COMPARATOR
105	TC74HC153P	H SYNC SW
106	TC74HC4538P	CLAMP PULSE GEN
201	SN74HC36N	NAND GATE
202	MC74HC74N	COMP SYNC
203	TC74HC4538P	HD DELAY
204	TC74HC4538P	COMPARATOR
205	TC74HC153P	CLAMP PULSE GEN
206	TC74HC4538P	V SYNC
301	TC74HC153P	V SYNC SW
302	TC74HC4538P	CLAMP PULSE GEN & COMPARATOR
Q2	DTC114ES	INVERTER
101	2SC2785	BUFF
102	2SC2785	BUFF
103	2SC2785	BUFF
104	2SC2785	BUFF
105	2SC2785	BUFF
106	2SC2785	BUFF
108	2SA1206-K1	SYNC AMP
109	2SC2570A	SYNC AMP
110	2SC2570A	SYNC AMP
111	2SA979	COMPARATOR
112	2SC2785	BUFF
113	2SA1175	BUFF
114	2SA979	EQUIVALENT PULSE ELIM
115	2SA979	H/V SYNC GEN
117	2SA1175	H/V SYNC DELAY
118	2SC2785	V SYNC SEP
119	2SC2785	BUFF
120	2SA1175	BUFF
121	2SC2785	BUFF
122	2SC2785	BUFF
123	2SA1175	BUFF
124	2SC2785	HD AMP
125	2SC2785	HD AMP
126	2SA1175	HD AMP
201	2SC2785	BUFF
202	2SC2785	BUFF
203	2SC2785	BUFF
204	2SC2878	BUFF
301	2SC2785	BUFF
302	2SC2785	BUFF
303	2SA1175	BUFF
304	2SC2785	VD AMP
305	2SC2785	VD AMP
306	2SA1175	VD AMP
307	2SC2785	BUFF
D2	1SS119	
4	1SS119	
5	1SS119	
6	1SS119	
7	1SS119	
8	1SS119	
9	1SS119	
11	1SS119	
101	1SS119	
102	1SS119	
103	1SS119	
104	1SS119	
105	1SS119	
106	1SS119	
107	1SS119	
108	1SS119	
110	RD5.6ES-B2	
111	RD5.6ES-B2	
112	RD5.6ES-B2	
202	1SS119	
301	1SS119	
302	1SS119	
303	1SS119	
304	1SS119	

BF board (SYNC PROCESSOR)

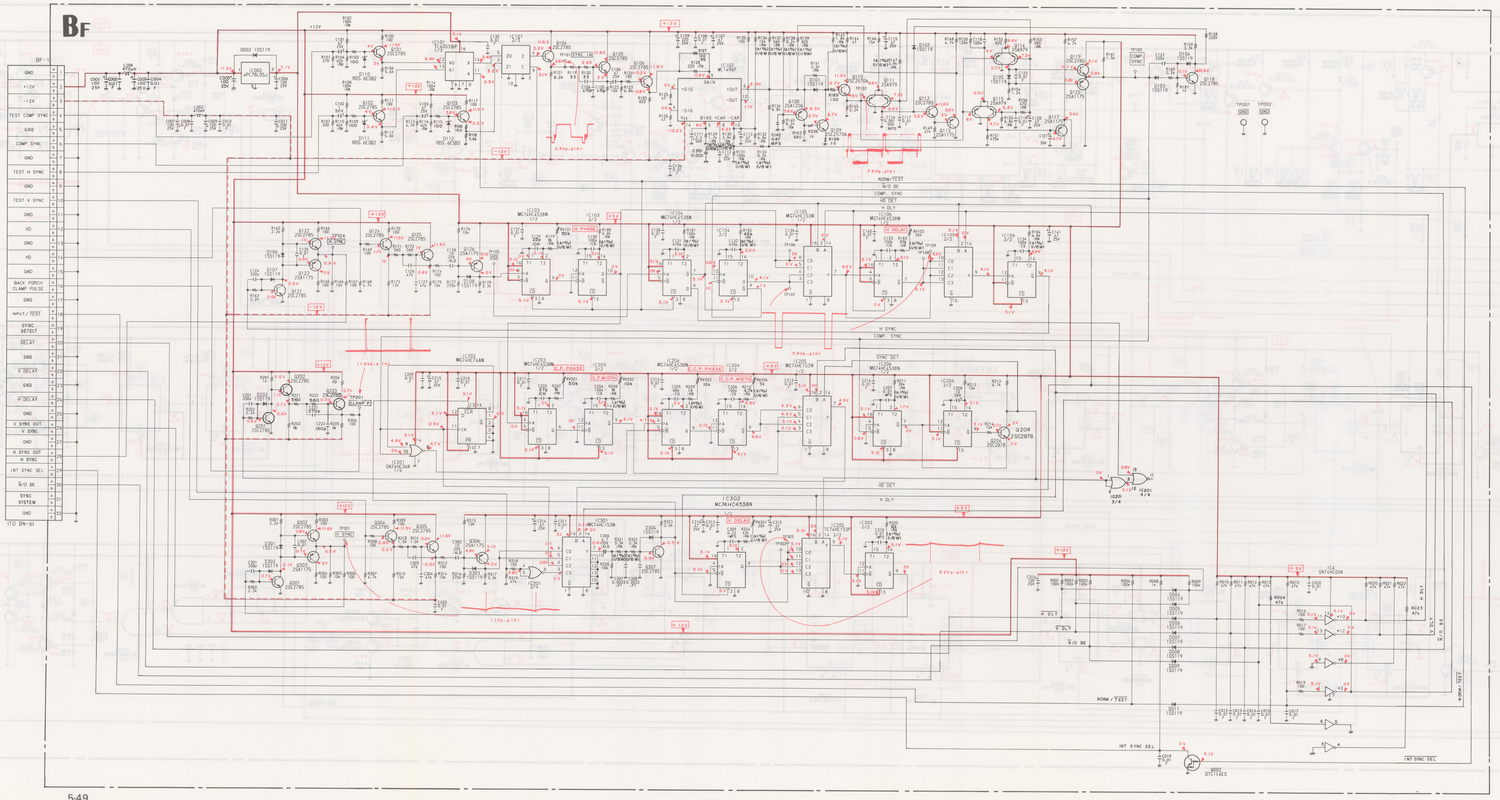
IC	002, 101, 102, 103, 104, 105, 106, 201, 202, 203, 204, 205, 206, 301, 302
Q	108, 109, 110, 111, 112, 113, 114, 115, 101, 106, 117, 118, 119, 120, 104,102,103, 105, 126,125, 124, 123, 122, 121, 306, 002, 203, 307, 202, 304, 204, 303, 205, 305, 201, 301, 302
D	101, 002, 102, 103, 104, 105, 108, 111, 110, 112, 106, 107, 011, 007, 005, 006, 004, 008,009, 303, 304, 202, 302, 301
ADJ TP	TP001, TP002, TP101, RV101, TP102, TP104, TP105, TP106, TP107, TP108, TP109, RV102, TP201, TP103, RV201, RV202, RV203, RV204, RV301, TP301, TP302, TP303



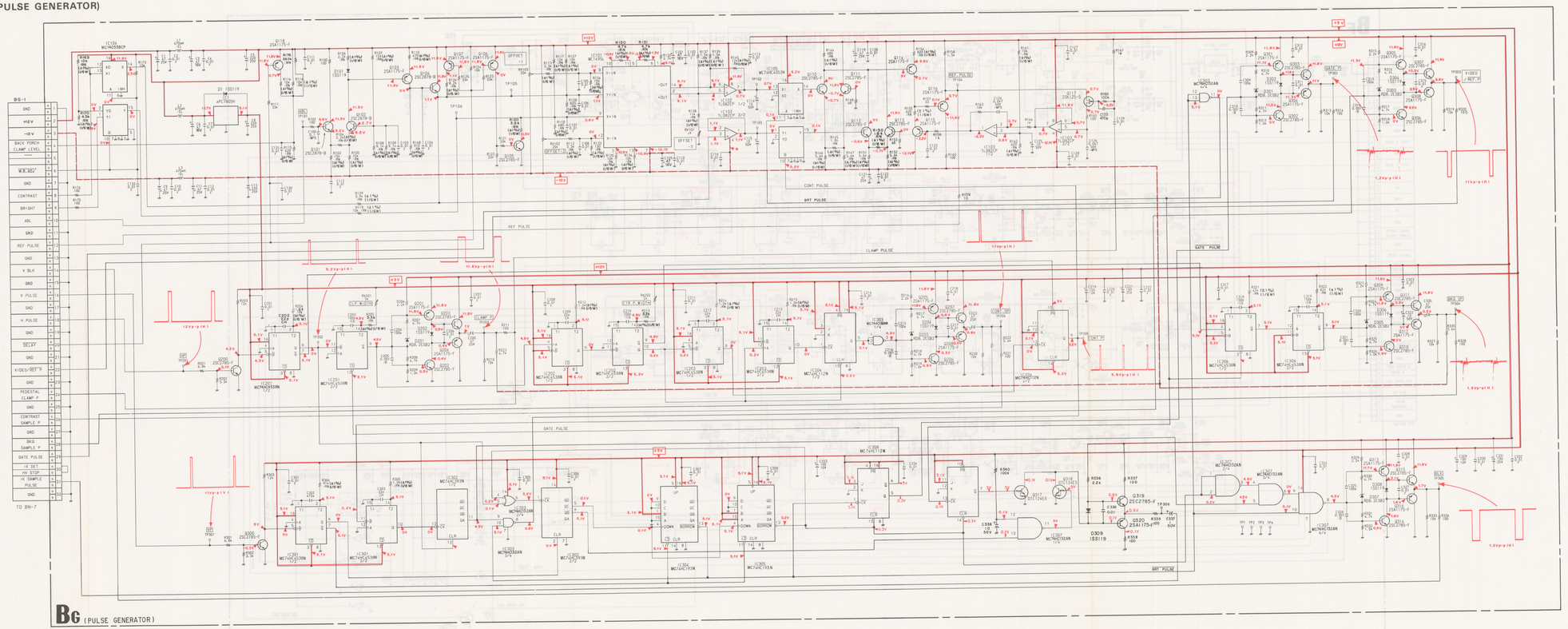
: Conductor side pattern

: Component side pattern

BF board (SYNC PROCESSOR)



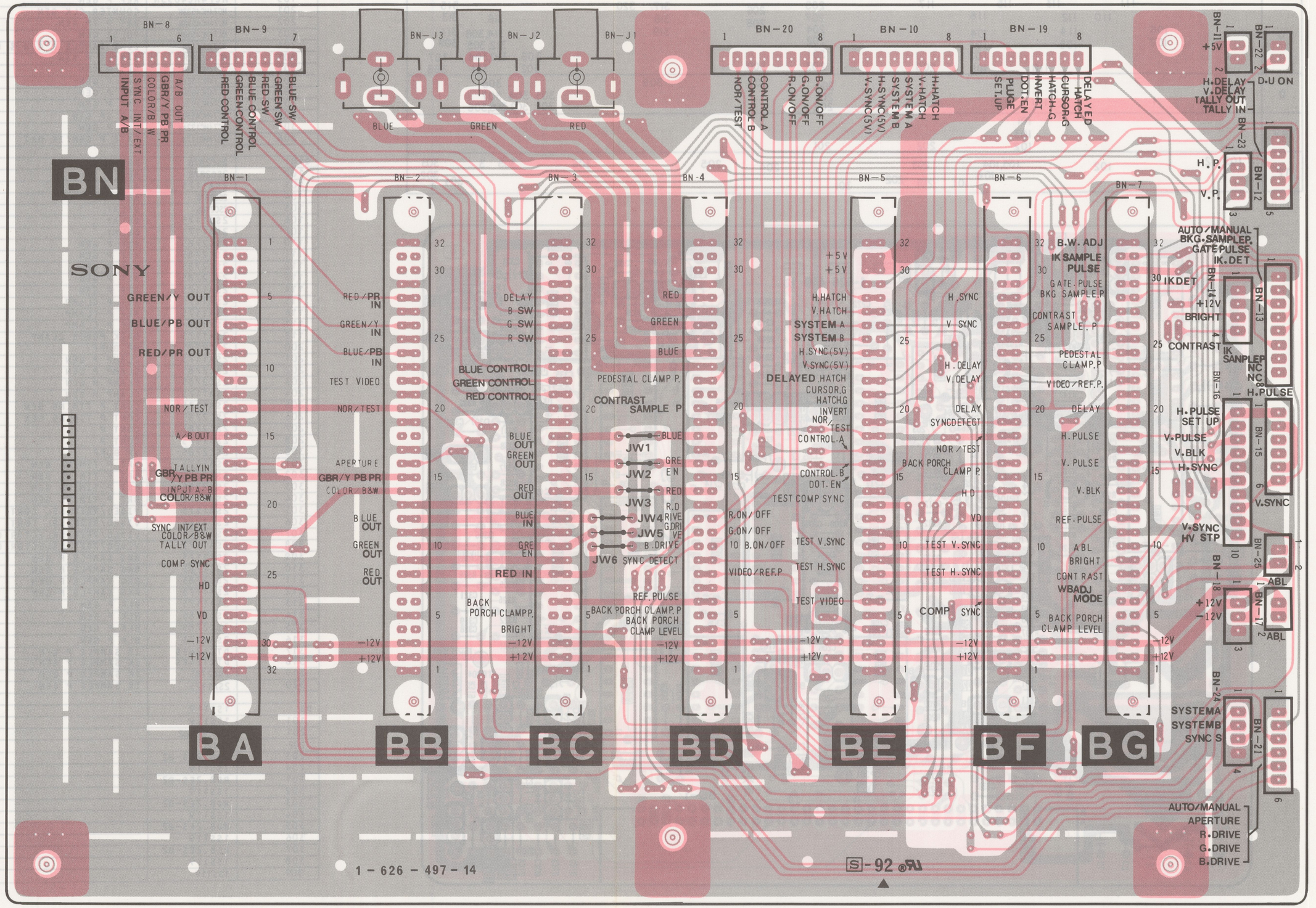
BG board (PULSE GENERATOR)



BG board (PULSE GENERATOR)

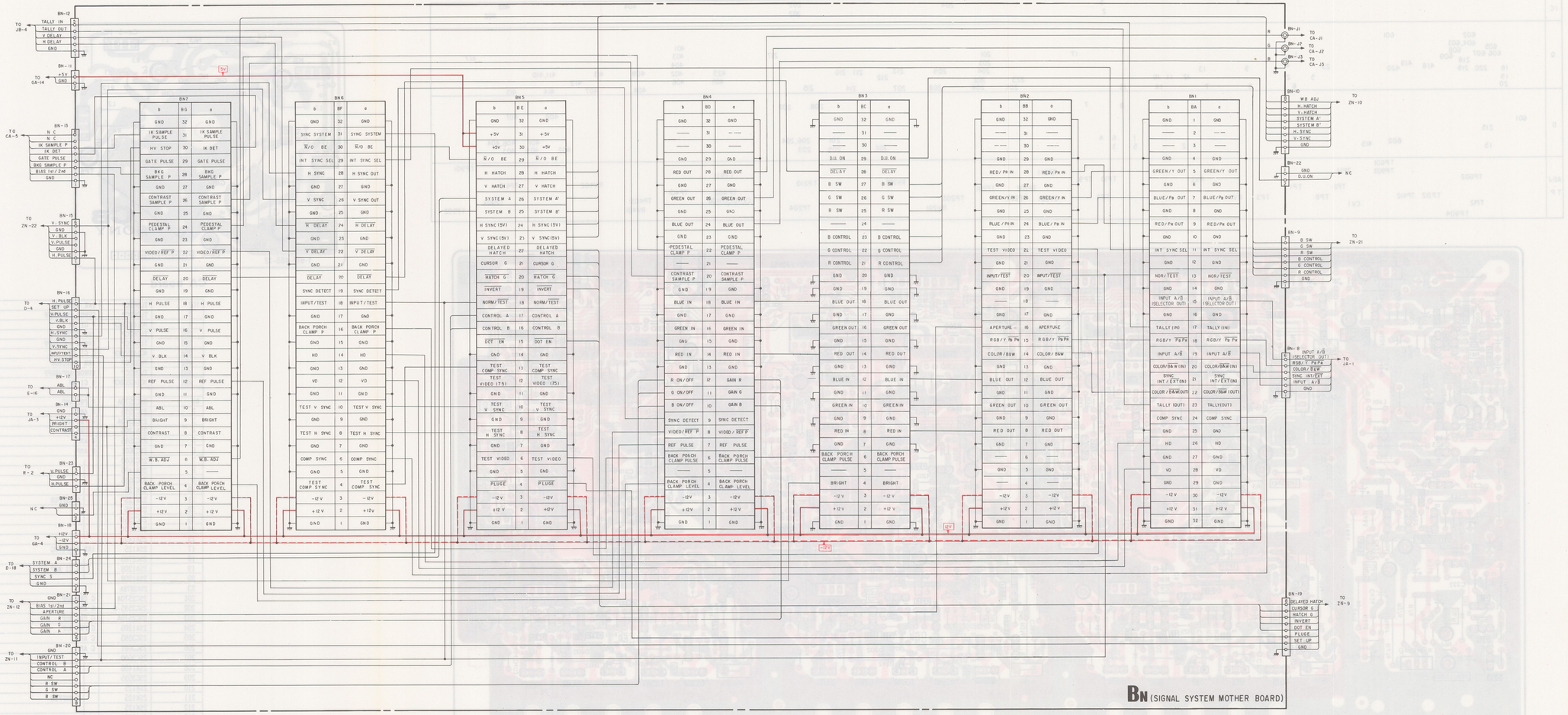
| | | |

BN board (SIGNAL SYSTEM MOTHER BOARD)

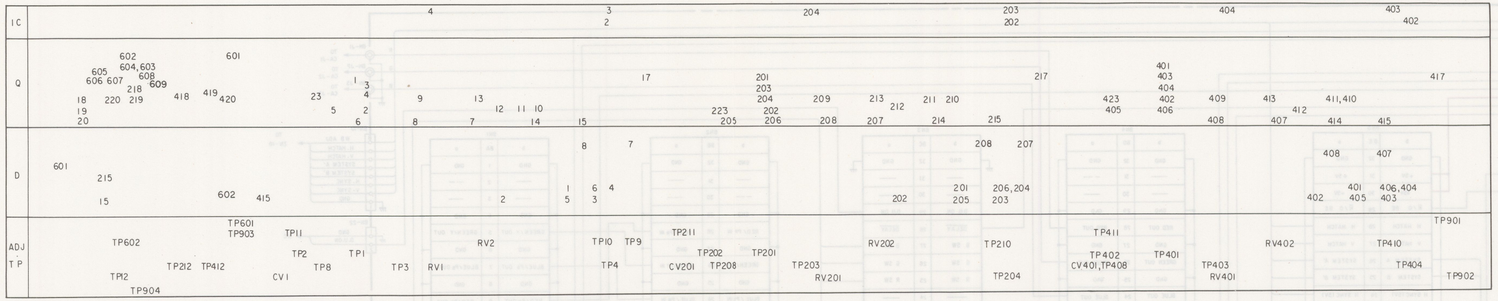


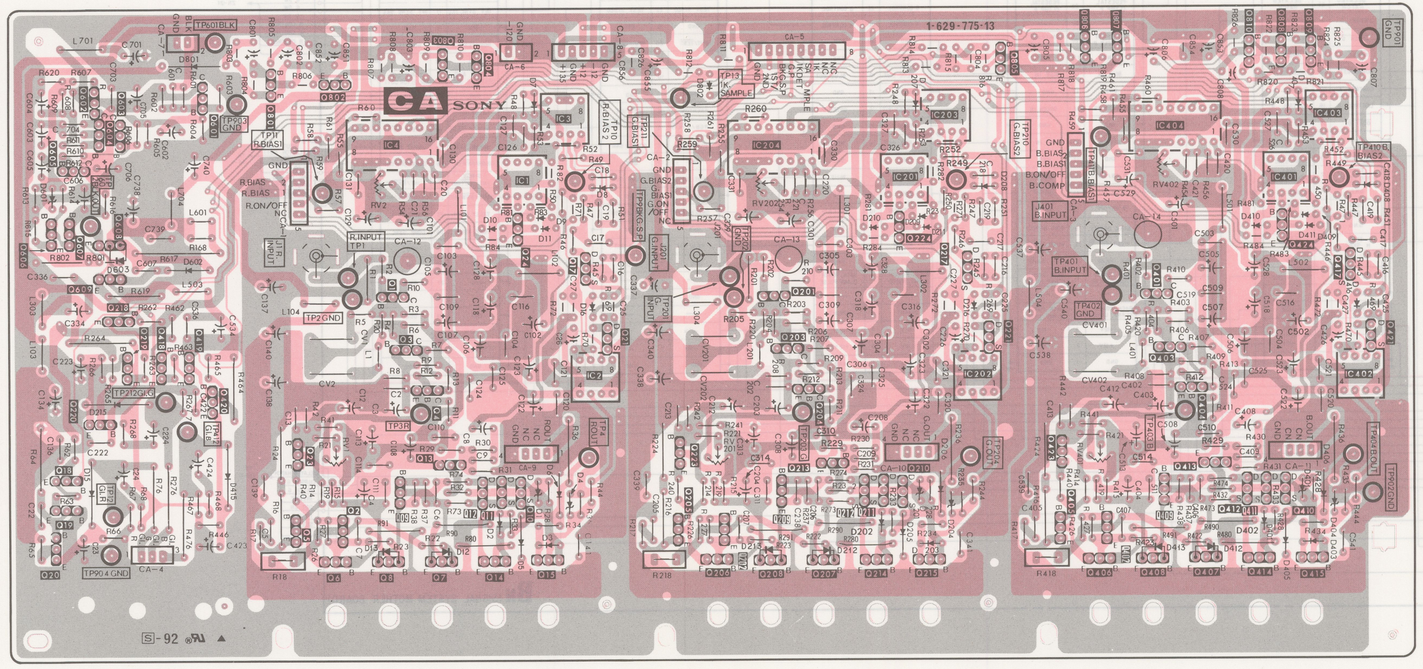
• : Conductor side pattern
• : Component side pattern

BN board (SIGNAL SYSTEM MOTHER BOARD)



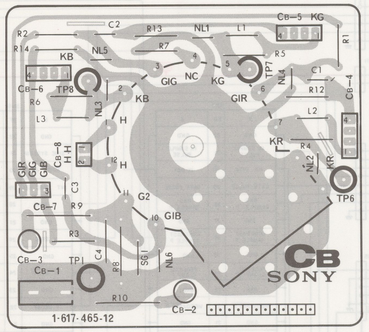
CA board (VIDEO OUTPUT)





● : Conductor side pattern
● : Component side pattern

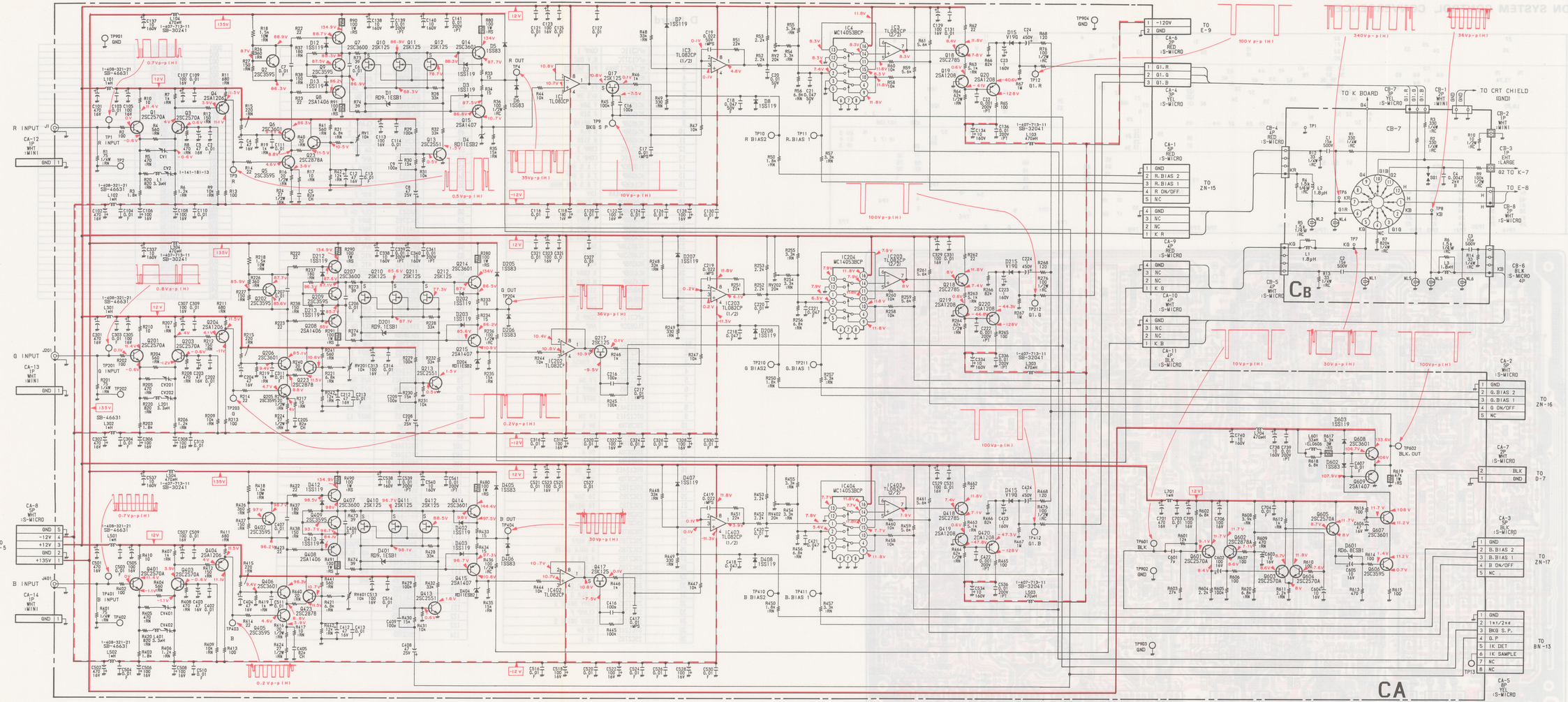
CB board (PICTURE TUBE SOCKET)



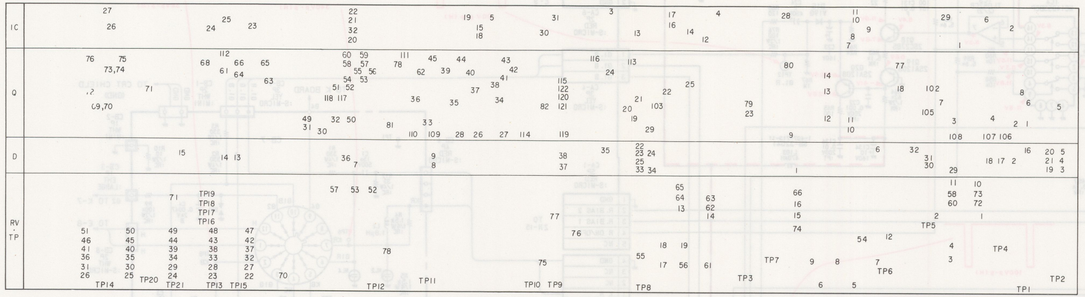
CA board

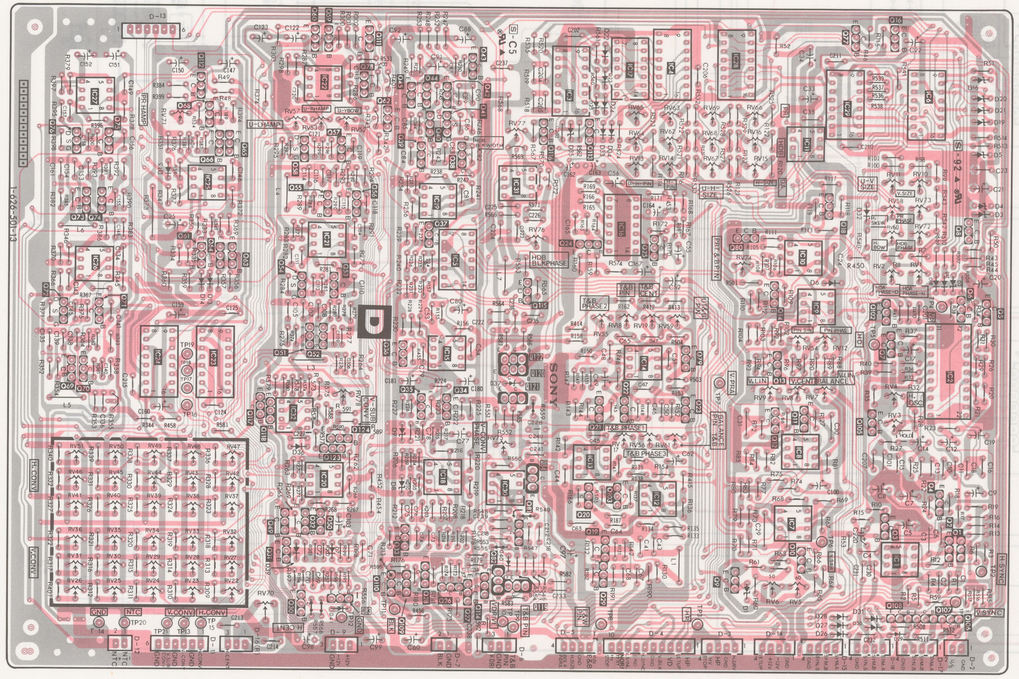
IC2	TL082CI'	IKR DETECTOR
3	TL082CP	ERROR AMP/BUFF
4	MC14053BCP	R G1 SW
202	TL082CI'	IKG DETECTOR
203	TL082CI'	ERROR AMP/BUFF
204	MC14053BCP	G G1 SW
402	TL082CP	IKB DETECTOR
403	TL082CI'	ERROR AMP/BUFF
404	MC14053BCP	B G1 SW
Q1	2SC2570A	R PRE AMP
2	2SC3595	R AMP
3	2SC2570A	R PRE AMP
4	2SA1206	R PRE AMP
5	2SC3595	R AMP
6	2SC3601	R AMP
7	2SC3600	
8	2SA1406	
9	2SC3595	
10	2SK125	
11	2SK125	R BUFFER
12	2SK125	
13	2SC2551	
14	2SC3601	
15	2SA1407	
17	2SK125	IKR SAMPLING
18	2SC2785	
19	2SA1208	R G1 AMP
20	2SA1208	
23	2SA2878A	
201	2SC2570A	G PRE AMP
202	2SC3595-D	G AMP
203	2SC2570A	G PRE AMP
204	2SA1206	G PRE AMP
205	2SC3595	G AMP
206	2SC3601	G AMP
207	2SC3600	
208	2SA1406	
209	2SC3595	
210	2SK125	
211	2SK125	G BUFFER
212	2SK125	
213	2SC2551	
214	2SC3601	
215	2SA1407	
217	2SK125	IKG SAMPLING
218	2SC2785	
219	2SA1208	G G1 AMP
220	2SA1208	
223	2SA2878A	
401	2SC2570A	B PRE AMP
402	2SC3595	B AMP
403	2SC2570A	B PRE AMP
404	2SA1206	B PRE AMP
405	2SC3595	B AMP
406	2SC3601	B AMP
407	2SC3600	
408	2SA1406	
409	2SC3595	
410	2SK125	
411	2SK125	B BUFFER
412	2SK125	
413	2SC2551	
414	2SC3601	
415	2SA1407	
417	2SK125	IKB SAMPLING
418	2SC2785	
419	2SA1208	B G1 AMP
420	2SA1208	
423	2SA2878A	
601	2SC2570A	
602	2SA2878A	
603	2SC2570A	
604	2SC2570A	
605	2SC2570A	BLK PULSE AMP
606	2SC3595	
607	2SC3601	
608	2SC3601	
609	2SA1407	
D1	RD9.1ESB1	
2	1SS119TD	
3	1SS119TD	
4	RD11ESB2	
5	1SS83	
6	1SS83	
7	1SS119TD	
8	1SS119TD	
9	1SS199	
10	1SS199	
12	1SS119TD	
13	1SS119TD	
15	V19G	CLAMP
201	RD9.1ESB1	
202	1SS119TD	
203	1SS119TD	
204	RD11ESB2	
205	1SS83	
206	1SS83	
207	1SS119TD	
208	1SS119TD	
209	1SS199	
210	1SS199	
212	1SS119	
213	1SS119	
215	V19G	CLAMP
401	RD9.1ESB1	
402	1SS119TD	
403	1SS119TD	
404	RD11ESB2	
405	1SS83	
406	1SS83	
407	1SS119TD	
408	1SS119TD	
409	1SS199	
410	1SS199	
412	1SS119TD	
413	1SS119TD	
415	V19G	CLAMP
601	RD6.8ESB1	
602	1SS83	
603	1SS119TD	

CA board (VIDEO OUTPUT) CB board (PICTURE TUBE SOCKET)



D board (DEFLECTION SYSTEM CONTROL, CONVERGENCE)





D board

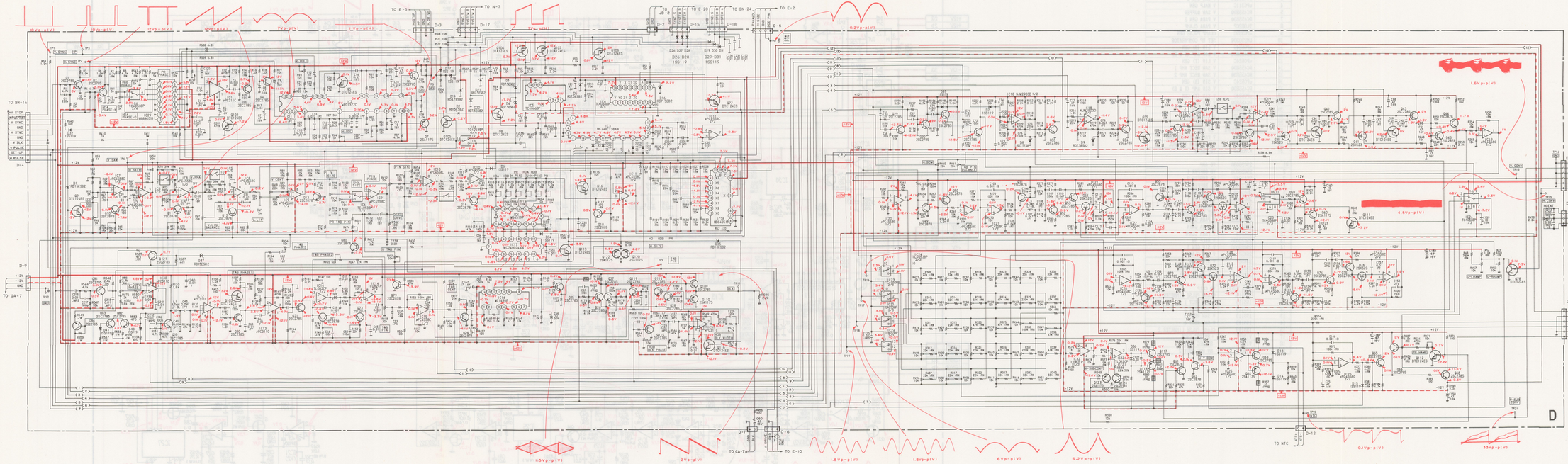
IC1	uPC311C	COMP 1
2	uPC1377C	H.V OSC
3	MC74HC138AN	PIN SELECT
4	M54519P	BUFF
5	TC4066BP	FV SW
6	TC4053BP	U/S SW
7	RC4558P	V SAW
8	RC4558P	H SIN
9	RC4558P	V DRIVE
10	RC4558P	H PIN
11	RC4558P	H SIZE
12	uPC311C	COMP 2
13	uPC311C	COMP 3
14	TL082CP	T & B (H)
15	RC4558P	T & B AMP
16	MC1496P	T & B PIN MODU
17	MC74HC04AN	INV
18	MJM2903D	V COMP
19	RC4558P	2V SAW
20	RC4558P	V CONV 1
21	RC4558P	V CONV 2
22	RC4558P	V CONV 3
23	TC4053BP	SW 1
24	TC4053BP	SW 2
25	RC4558P	NTC
26	RC4558P	H CONV 1
27	RC4558P	H CONV 2
28	MB84051B	SIZE SW
29	MB84051B	PHASE SW
30	uPC311C	COMP 4
31	uPC311C	COMP 5
32	TL082CP	AMP
Q1	2SC2785	H SYNC
2	2SC2785	H PHASE 1
3	2SC2705	H PHASE 2
4	2SC2785	REG
5	DTC124ES	FV SW
6	2SC2785	BUFF 1
7	2SA1175	BUFF 1
8	DTC124ES	
9	DTC124ES	FV SW
10	2SC2878A	SW 1
11	2SC2878A	SW 2
12	2SC2878A	SW 3
13	2SC2878A	SW 4
14	2SC2878A	SW 5
16	DTC124ES	U/S SW
18	2SC2878A	SW 6
19	2SC2785	HD
20	2SC2785	TB SAW
21	2SC2785	TB DRIVE
22	2SC2878A	SW 7
23	2SC2878A	SW 8
24	2SC2878A	SW 9
25	2SC2785	TB BUFF
26	2SC2785	H MBLK DRIVE
27	2SC2785	H BLK 1
28	2SC2785	V BLK
29	2SC2785	H PULSE
30	2SC2785	H BLK 2
31	2SC2785	H BLK 3
32	2SC2785	CONV DRIVE 1
33	2SC2785	CLAMP P
34	2SC2785	CONV DRIVE 2
35	DTC124ES	FV SW
36	2SC2785	SW 1

37	2SC2785	SW 2
38	2SK523	CLP SW 4
39	DTC124ES	FV SW
40	2SC2785	BUFF 2
41	2SK523	CLP SW 4
42	DTC124ES	FV SW
43	2SC2785	BUFF 3
44	2SC2878A	BUFF 1
45	2SC2878A	CLAMP 1
49	2SC2878A	CLAMP 2
50	2SC2878A	BUFF 2
51	2SC2878A	SW 10
52	2SC2785	AMP 1
53	2SC2785	BUFF 4
54	2SK523	CLP SW 1
55	2SC2878A	SW 11
56	2SC2785	AMP 2
57	2SC2785	BUFF 5
58	2SK523	CLP SW 2
59	2SC2785	BUFF 6
60	2SA1175	BUFF 2
61	2SC2878A	SW 12
62	2SC2878A	U/C SW
63	2SC2878A	NTC OUT
64	2SA1175	NTC OUT
65	2SC2785	BUFF 7
66	2SC2785	BUFF 8
68	2SC2785	BUFF 9
69	2SC2878A	SW 13
70	2SC2785	AMP 3
71	2SC2785	BUFF 10
72	2SK523	CLP SW 3
73	2SC2878A	SW 14
74	2SC2785	AMP 4
75	2SC2785	BUFF 11
76	2SK523	CLP SW 4
77	DTC124ES	
78	DTC124ES	U/S SW
79	2SC2878A	U/S SW
80	2SC2878A	PROG SW
81	2SC2785	BUFF 12
82	2SC2785	BUFF 13
83	2SC2785	
84	2SC2785	
102	DTC124ES	
103	DTC124ES	
105	DTC124ES	
106	DTC124ES	
107	DTC124ES	
108	DTC124ES	
109	2SC2785	AMP 5
110	2SA1175	AMP 1
111	DTC124ES	PROG SW
112	DTC124ES	PROG SW
113	DTC124ES	
114	2SC2785	COMPOSITE BLANKING
115	2SC2785	HDB BLANKING
116	DTC124ES	HDB SW
117	2SC2785	AMP
118	2SC2785	AMP
119	2SC2785	
120	2SA1175	
121	2SC2785	
122	2SA1175	
123	2SA1175	
124	2SC2785	

D001	RD1SES-B2	
002	RD1SES-B2	
003	RD7.5ES-B2	
004	RD7.5ES-B2	
005	RD7.5ES-B2	
006	1SS199	
007	1SS199	
008	RD7.5ES-B2	
009	RD7.5ES-B2	
013	1SS199	
014	1SS199	
015	1SS199	
016	RD7.5ES-B2	
017	1SS199	
018	1SS199	
019	RD4.7ES-B2	
020	RD7.5ES-B2	
021	RD7.5ES-B2	
022	1SS199	
023	1SS199	
024	1SS199	
025	1SS199	
026	1SS199	
027	1SS199	
028	1SS199	
029	1SS199	
030	1SS199	
031	1SS199	
032	1SS199	
033	1SS199	
034	1SS199	
035	RD1SES-B2	
036	1SS199	
037	RD1SES-B2	
039	1SS199	
040	1SS199	
041	1SS199	

• : Conductor side pattern
• : Component side pattern

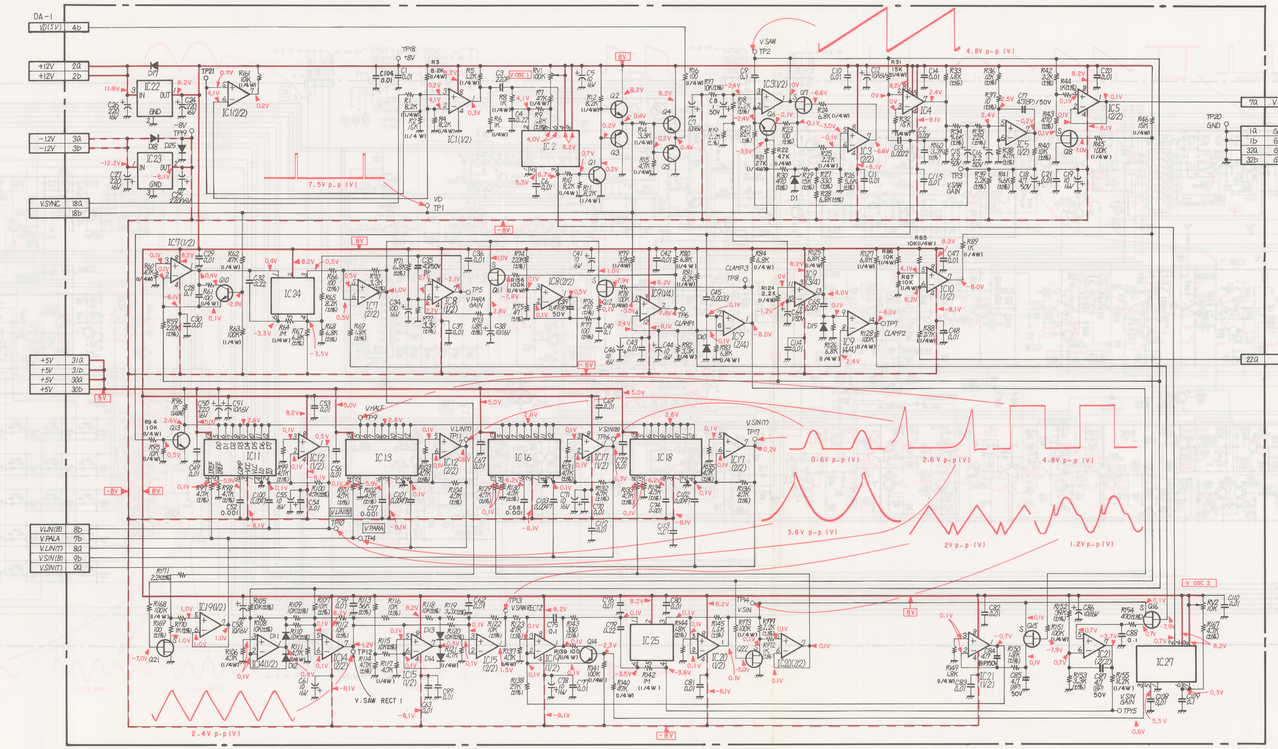
D board (DEFLECTION SYSTEM CONTROL, CONVERGENCE)



DA board

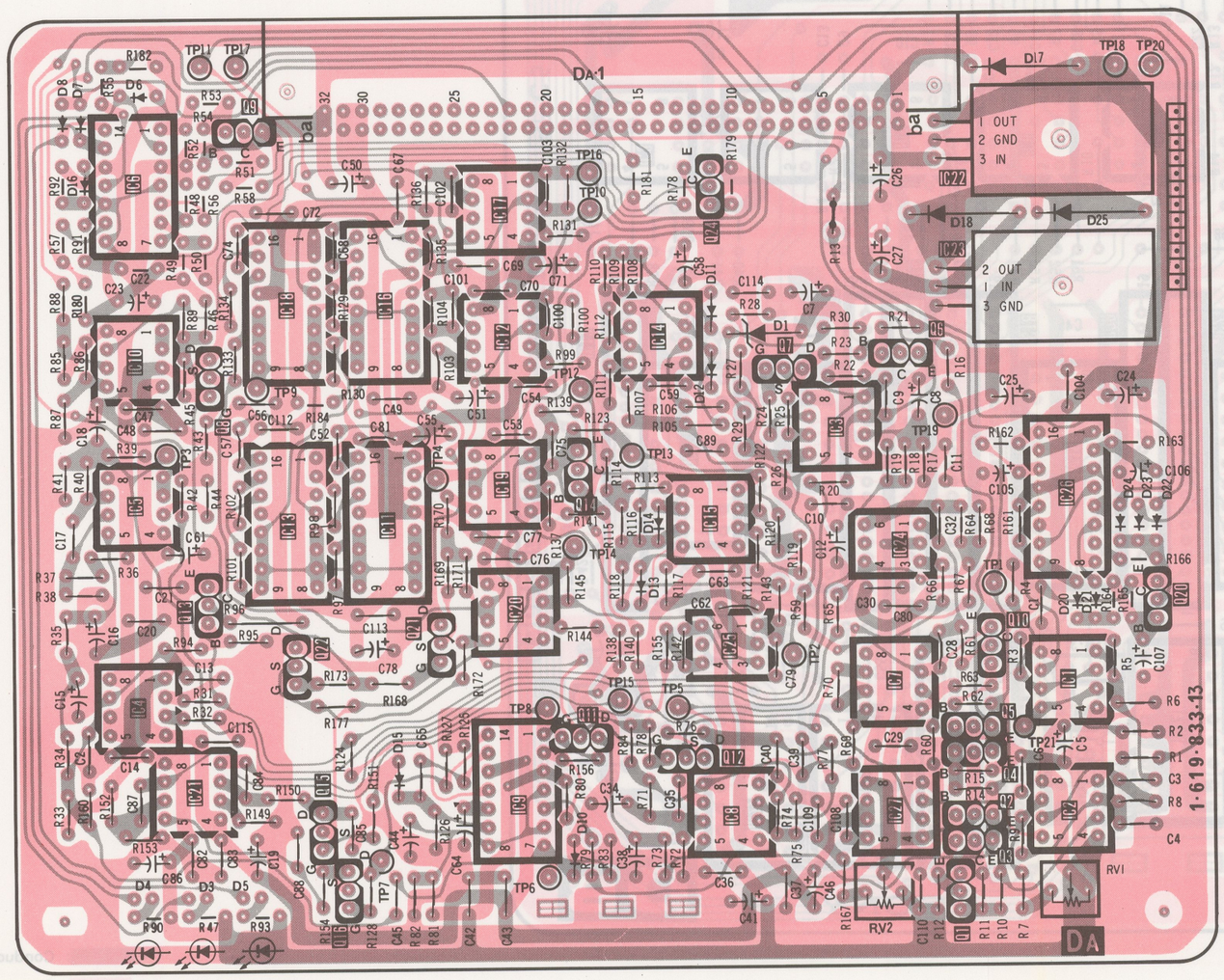
IC1	LM2903DQ	V SYNC COMPARATOR
2	NJM555D	VD GEN 1
3	RC4558DQ	V SAW GNE 2
4	uPC311C	V BALF GEN
5	RC4558DQ	V SAW BUFFER
7	RC4558DQ	V PARA GEN 2
8	TL082CP	V PARA CLAMP
9	uPC339C	CLAMP PULSE GEN
10	LM2903DQ	SET UP COMPARATOR
11	uPC824C	V LIN (B) GEN
12	RC4558DQ	V LIN AMP (T & B)
13	uPC824C	V LIN (T) GEN
14	RC4558DQ	V SAW RECT AMP 1
15	RC4558DQ	V SAW RECT AMP 2
16	uPC824C	V SIN (B) GEN
17	RC4558DQ	V SIN AMP (T & B)
18	uPC824C	V SIN (T) GEN
19	RC4558DQ	V SIN GEN
20	RC4558DQ	V SIN GEN
21	TL082CP	V SIN CLAMP
22	uPC78M08H	+8V REG
23	NJM79M08FA	-8V REG
24	TX-429M	V PARA GAIN CONTROL
25	TX-429M	V SIN GAIN CONTROL
27	NJM555D	VD GEN 2
Q1	2SC2603G	VD AMP
2	2SC2603G	VD BUFFER 1
3	2SA1048	VD BUFFER 2
4	2SC2603G	VD BUFFER 3
5	2SA1048	VD BUFFER 4
6	2SC2603G	V SAW GEN 1
7	2SK523	V SAW GEN 2
8	2SK523	SET UP (V SAW)
10	2SC2603G	V PARA GEN 1
11	2SK523	V PARA GAIN
12	2SK523	V PARA CLAMP
13	2SC2603G	V BALF SW
14	2SC2603G	V SIN GEN 1
15	2SK523	V SIN CLAMP
16	2SK523	V SIN GAIN
21	2SK523	SET UP (V PARA)
22	2SK523	SET UP (V SIN)
D1	RD5.1EN1	VD CLIP
10	1SS119	CLAMP PULSE LIMMETER 1
11	1SS119	V SAW RECT 1
12	1SS119	V SAW RECT 2
13	1SS119	V SAW RECT 3
14	1SS119	V SAW RECT 4
15	1SS119	CLAMP PULSE LIMMETER 2
17	V1SEF1	+8V REG PROT
18	V1SEF1	-8V REG PROT 1
25	V1SEF1	-8V REG PROT 2

DA board (V. GENERATOR)



DA board (V. GENERATOR)

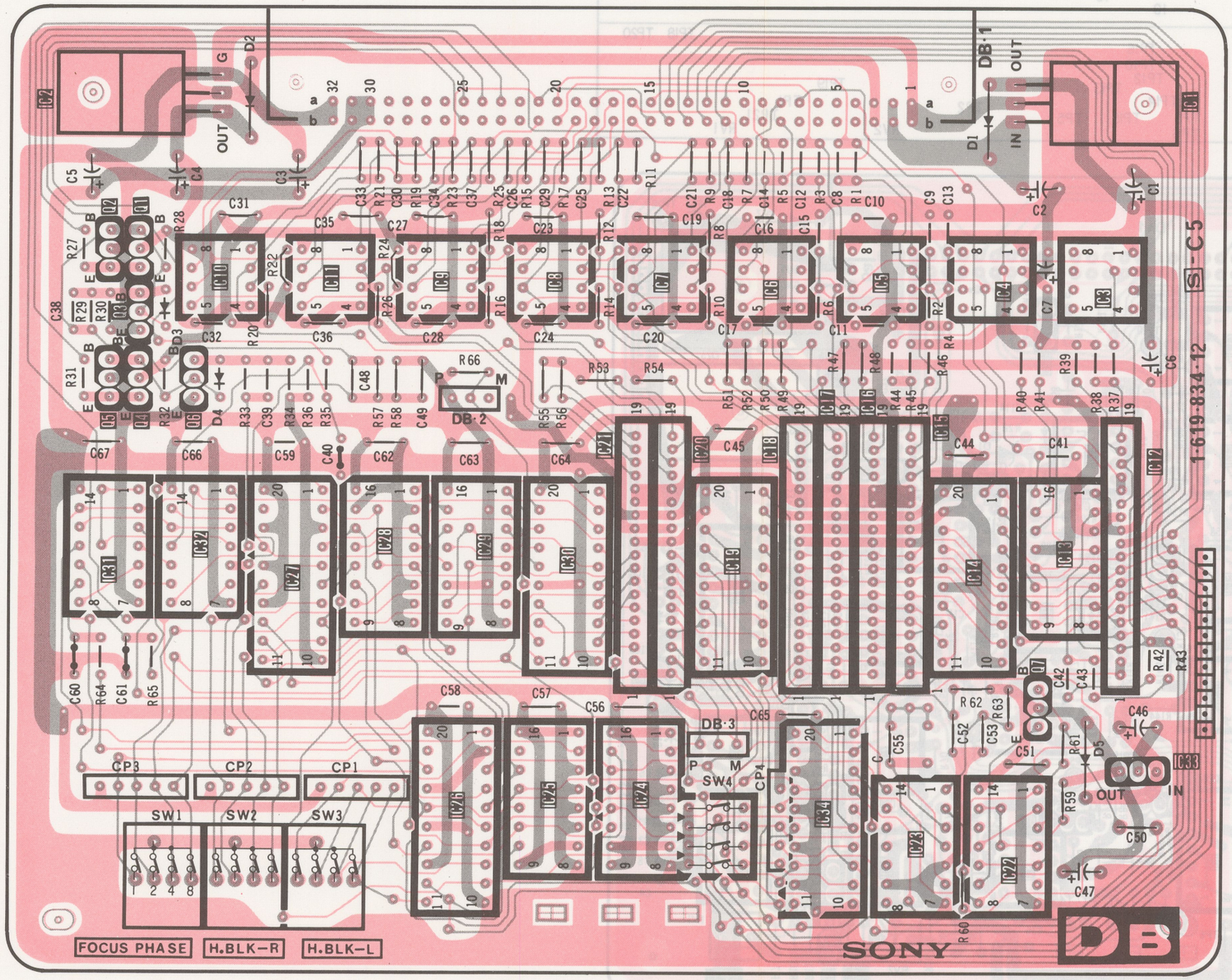
IC	10 5 4 21 18 13 16 11 17 12 19 20 9 14 15 25 8 3 24 7 27 22 23 1 2
Q	8 13 22 21 15 16 14 11 12 7 6 10 5 4 2 3 1
D	11 12 1 18 25 17 15 10 13 14
ADJ・TP	TP11 TP17 TP3 TP4 TP7 TP16 TP10 TP12 TP13 TP14 TP8 TP6 TP15 TP5 TP2 RV2 TP19 TP1 TP21 RV1 TP18 TP20



● : Conductor side pattern
● : Component side pattern

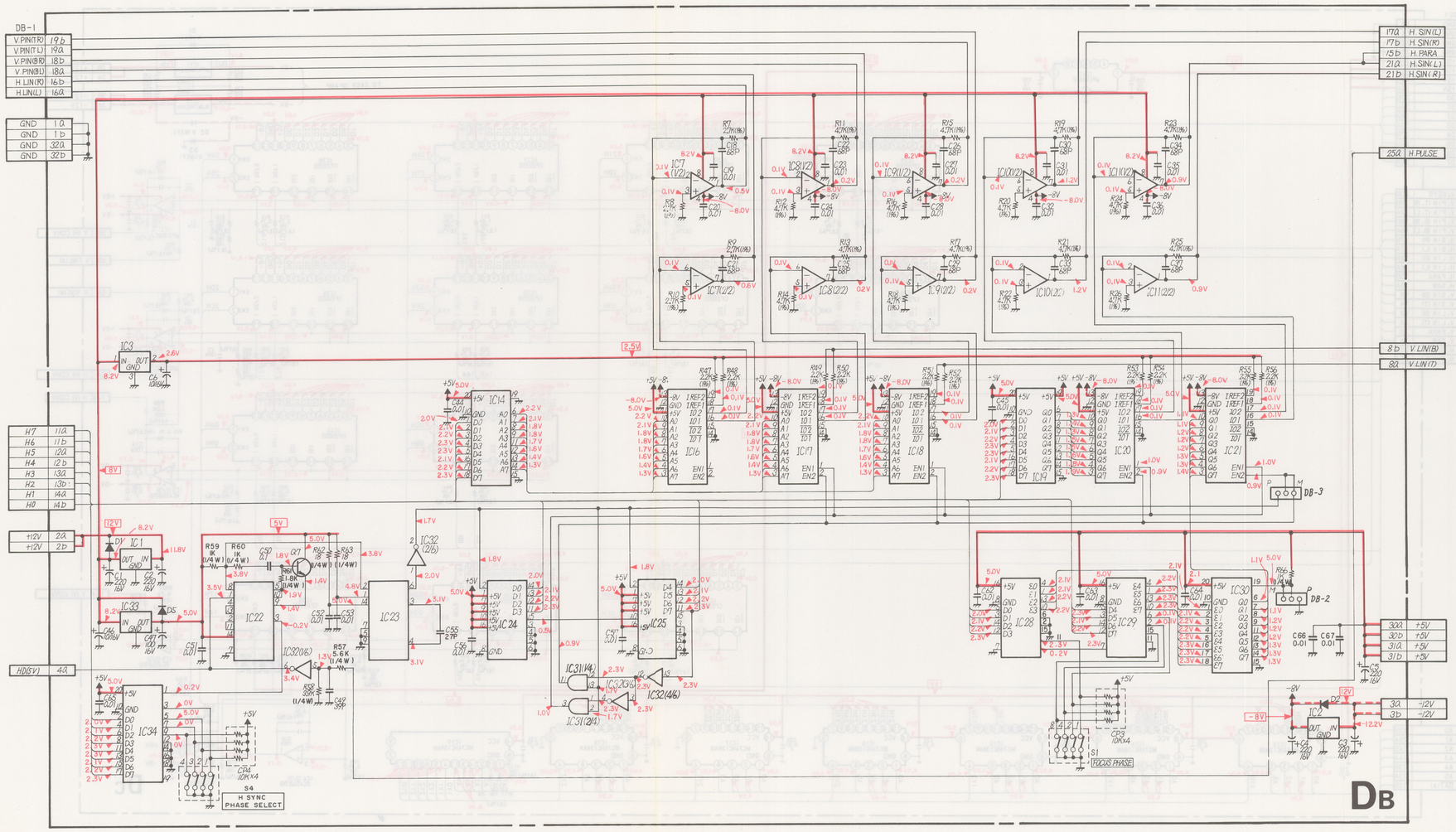
DB board (H. GENERATOR)

IC	2 31	10 32	11	9 28	8 29	30 25	7 21	20 24	19	18 34	17	16 23	14	1 22	3 33
Q														7	
D	2									1					5



• : Conductor side pattern
• : Component side pattern

DB board (H. GENERATOR)



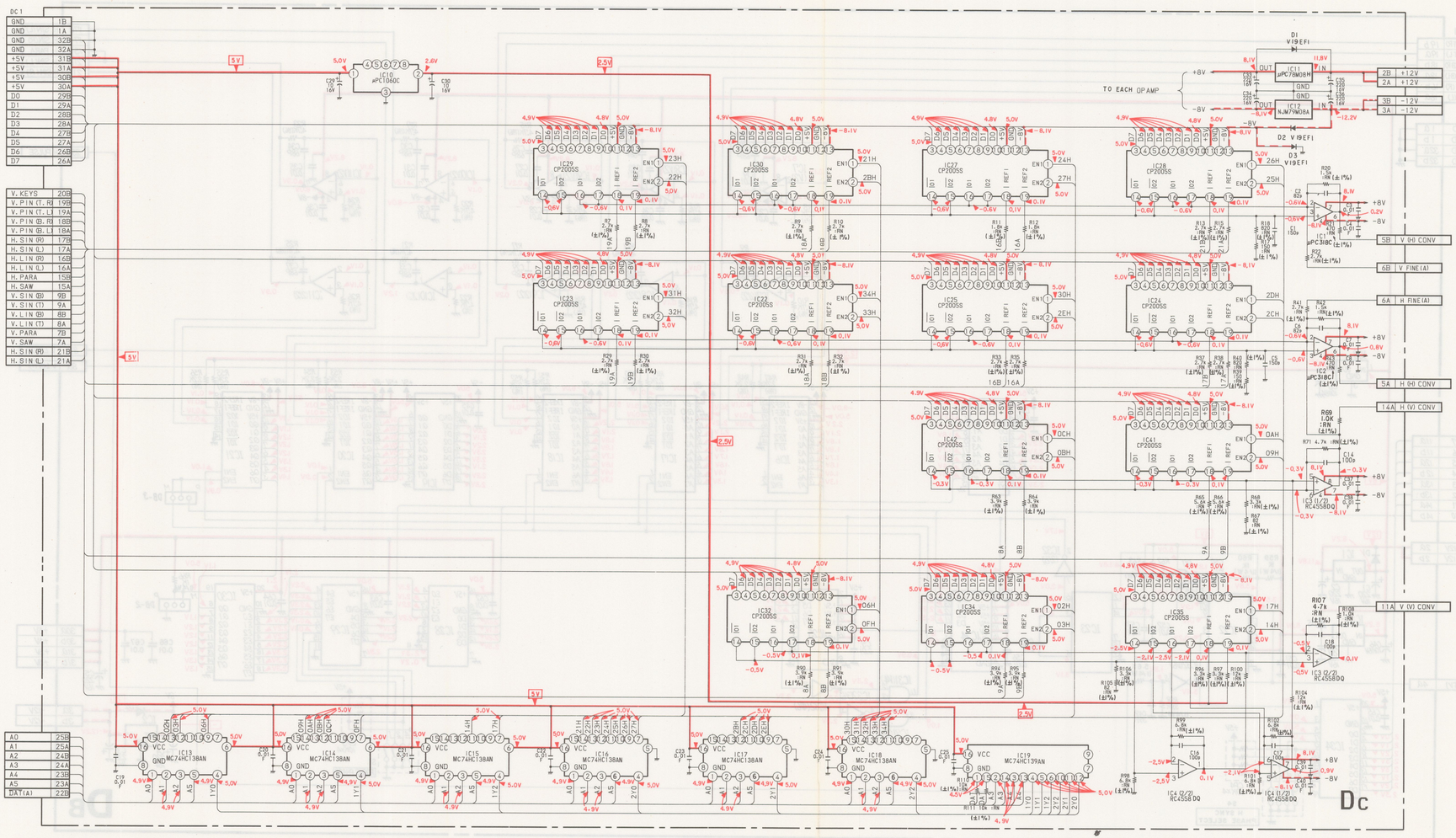
DB board

IC1	NJM78M08H	+8V REG
2	NJM79M08FA	-8V REG
3	uPC1060C	+2.5V REG
7	TL082CP	H LIN (R & L) AMP
8	TL082CP	V PIN (B.L & B.R) AMP
9	TL082CP	V PIN (T.L & T.R) AMP
10	TL082CP	H SIN (R & L) AMP
11	TL082CP	H LIN (MR & ML) AMP
14	TBP28L42N	H PARA 1
16	CP2005S	V LIN (R & L) GEN
17	CP2005S	V PIN (B.L & B.R) GEN
18	CP2005S	V PIN (T.L & T.R) GEN
19	TBP28L42N	H SIN 1
20	CP2005S	H SIN (R & L) GEN
21	CP2005S	H SIN (MR & ML) GEN
22	MC4044P	PLL 1
23	MC4024P	PLL 2
24	SN74S163N	H COUNTER 1
25	SN74S163N	H COUNTER 2
28	SN74LS283N	H FOCUS PHASE 1
29	SN74LS283N	H FOCUS PHASE 2
30	TBP28L42N	H SIN 2
31	SN74LS08N	NAND
32	SN74LS04N	INV
33	uPC78L05	+5V REG
34	SN74LS682N	
Q7	2SC2603G	PLL BUFFER
D1	V19EF1	+8V REG PROT
2	V19EF1	-8V REG PROT
5	V19EF1	+5V REG PROT

DC board

IC1	uPC318C	V (H) CONV AMP
2	uPC318C	H (H) CONV AMP
3	RC4558DQ	H(V) CONV/V(V) CONV AMP
4	RC4558DQ	H.STAT/V.STAT AMP
10	uPC1060C	+2.5V REG
11	uPC78M08H	+8V REG
12	NJM79M08A	−8V REG
13	MC74HC138A	ADD DECODER (1)
14	MC74HC138A	ADD DECODER (2)
15	MC74HC138A	ADD DECODER (3)
16	MC74HC138A	ADD DECODER (4)
17	MC74HC138A	ADD DECODER (5)
18	MC74HC138A	ADD DECODER (6)
19	MC74HC139A	ADD DECODER (7)
22	CP2005S	H CONV (B-S)
23	CP2005S	H CONV (T-S)
24	CP2005S	H CONV (M)
25	CP2005S	H CONV (S)
27	CP2005S	CONV (S)
28	CP2005S	CONV (-M)
29	CP2005S	CONV (T-S)
30	CP2005S	CONV (B-S)
32	CP2005S	CONV (T & B)
34	CP2005S	CONV (M)
35	CP2005S	H/V STAT
41	CP2005S	CONV (C.M)
42	CP2005S	CONV (T & B)
D1	V19EF1	+8V REG PROT
2	V19EF1	−8V REG PROT 1
3	V19EF1	−8V REG PROT 2

DC board (DIGITAL GAIN CONTROL)

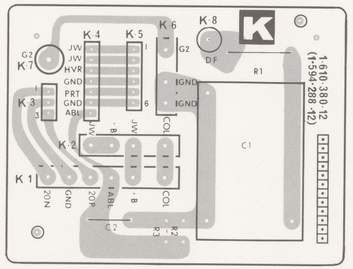


DC board (DIGITAL GAIN CONTROL)

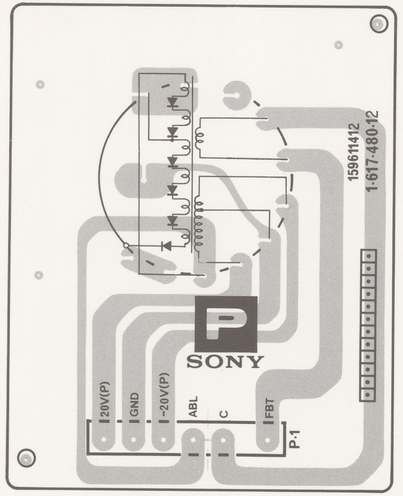
| | | |

E, K, P

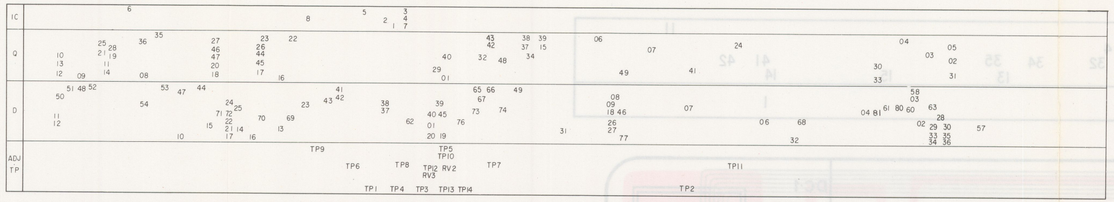
K board (DYNAMIC FOCUS, CONNECTOR RELAY)

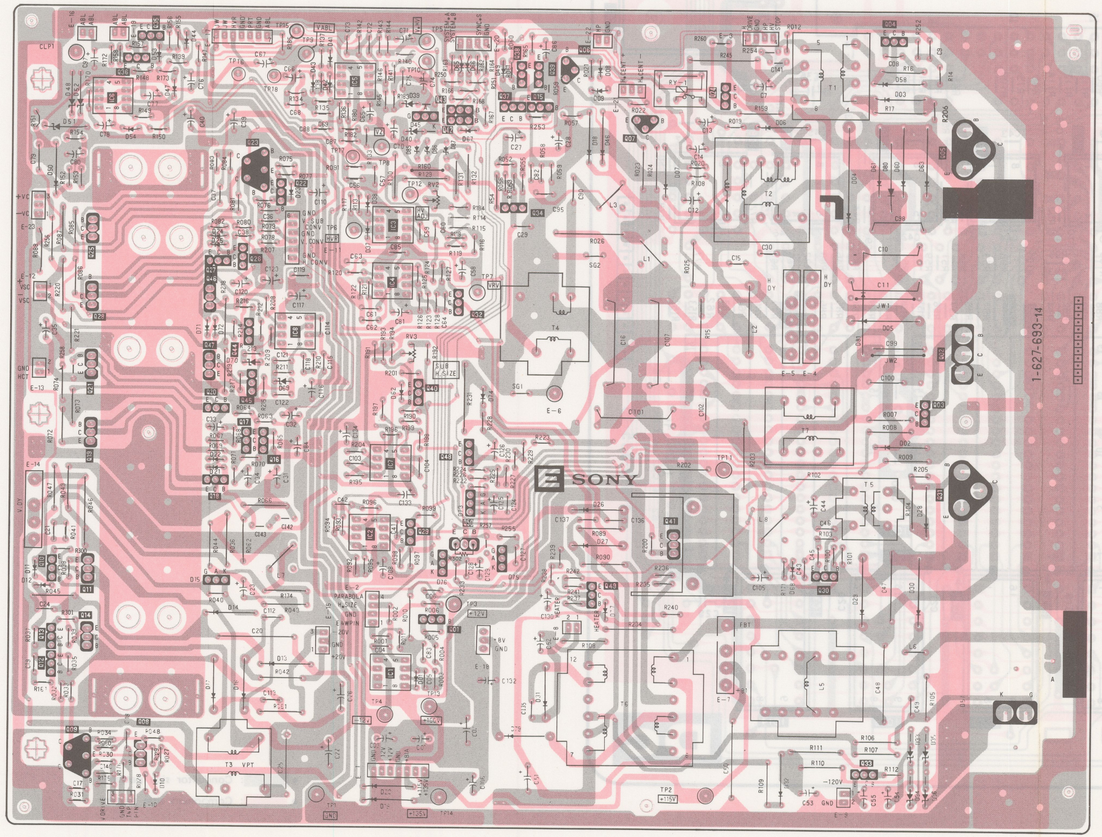


P board (EHT TRANSFORMER)



E board (H/V DEFLECTION OUTPUT, DYNAMIC FOCUS, ENT REG)





E board

IC1	RC4558DQ	H PIN
2	NJM2903D	H DRIVE
3	RC4558DQ	HV REG
4	NJM2903D	HV DRIVE
5	NJM2903D	HV PROTECT 1
6	NJM2903D	HV PROTECT 2
7	RC4558DQ	SUB H PIN
8	UPC3J18C	V CY DRIVE OUT
Q1	2SC3209	H PIN DRIVE 1
2	2SC3263	H PIN OUT
3	2SC3209	H PIN DRIVE 2
4	2SD1138	H DRIVE 1
5	2SD4532	H OUT
6	2SD1137	H CENT 1
7	2SB860	H CENT 2
8	2SA1175	V BIAS
9	2SA979	V PREAMP
10	2SC1890A	V DRIVE 2
11	2SD1137	V OUT 1
12	2SC1890A	V DRIVE 1
13	2SA893A	V DRIVE 3
14	2SB860	V OUT 2
15	2SC2878A	HP AMP 1
16	2SC2362K	HCT DRIVE 1
17	2SC2362K	HCT DRIVE 2
18	2SC1890A	HCT DRIVE 3
19	2SD669A	HCT OUT 1
20	2SA893A	HCT DRIVE 4
21	2SD669A	HCT OUT 2
22	2SA1175	V CY BIAS
23	2SA979	V CY PREAMP
24	2SC4054P	
25	2SD669A	V CY OUT 1
26	2SC1890A	V CY DRIVE 1
27	2SA893A	V CY DRIVE 2
28	2SD669A	V CY OUT 2
29	2SA1175	HV DRIVE 1
30	2SD789	HV DRIVE
31	2SC3387	HV OUT
32	2SB740	HV REG DRIVE
33	2SA1156	-120V REG
34	2SC3209	DF
35	2SC2785	ABL BUFF 2
36	2SA1175	ABL BUFF 1
37	2SC2878A	HP AMP 2
38	2SC2785	HP OUT
39	2SA1175	HP SW
40	2SC2785	PIN DRIVE
41	2SC2335	SUB H PIN OUT
42	2SC2785	PW SW
43	2SC2785	PW SW
44	2SB649A	V CY DRIVE OUT
45	2SD669A	V CY DRIVE OUT
46	2SD1137	V CY DRIVE OUT
47	2SB860	V CY DRIVE OUT
48	2SA1221	I1 PROTECT
49	2SA1221	IK DET
D1	1SS119	H PIN PROT
2	RH-1	H PIN PROT
3	RH-1	H DRIVE
4	ERD09-15	DUMP 3
5	ERD28-08S	SW 1
6	V19EF1	H CENT 1
7	V19EF1	H CENT 2
8	1SS119	BIAS 1
9	1SS119	BIAS 2
10	1SS119	BIAS 3
11	1SS119	BIAS 4
12	1SS119	BIAS 5
13	RH-1	V SUPPLY
14	RH-1	PROTECT
15	CR02AM-4	Vcc SW
16	ERD31-04	+20V RECT
17	ERD31-04	-20V RECT
18	V19EF1	-200V RECT
19	V19EF1	SW 1
20	V19EF1	SW 2
21	1SS119	BIAS 6
22	1SS119	BIAS 7
23	1SS119	BIAS 8
24	1SS119	BIAS 9
25	1SS119	BIAS 10
26	ERD31-04	+30V RECT
27	ERD31-04	-30V RECT
28	RH-1	HV DRIVE
29	ERD28-08S	D UMP 1
30	ERD28-08S	D UMP 2
31	ERD31-04	HEATER REG
32	V11N	-120V REF 1
33	HZT33-02	30V REF 1
34	HZT33-02	30V REF 2
35	HZT33-02	30V REF 3
36	HZT33-02	30V REF 4
37	1SS119	HV PROT 1
38	1SS119	HV PROT 2
39	HZT33-02	HV PROTECT REF 1
40	HZT33-02	HV PROTECT REF 2
41	1SS119	ABL STOP 1
42	1SS119	ABL STOP 2
43	1SS119	HV STOP 1
44	1SS119	HV STOP 2
45	CR02AM-4	HV PROT
46	V19EF1	H STOP 1
47	1SS119	BIAS 11
48	RD6.2EL2	H REF
49	1SS199	
50	RH-1	V STOP 1
51	RD10EL2	IK STOP
52	RD10EL2	V REF
53	1SS119	HV PROT 3
54	1SS119	H STOP OUT
57	SG-264A	HV REG
58	V19EF1	CLAMP
60	ERD28-08S	PIN 1
61	ERD28-08S	PIN 2
62	1SS119	CLAMP
63	ERC06-15SA	DUMP 3
65	1SS119	AND 1
66	1SS119	AND 2
67	1SS119	PROTECT
68	1SS119	BIAS 13
69	RD15ESB1	
70	RD15ESB1	
71	1SS119	
72	1SS119	
73	CR02AM-4	I1 PROTECT
74	1SS119	
75	CR02AM-4	
76	CR02AM-4	
77	1SS119	
80	ERD28-08S	
81	ERD09-15	

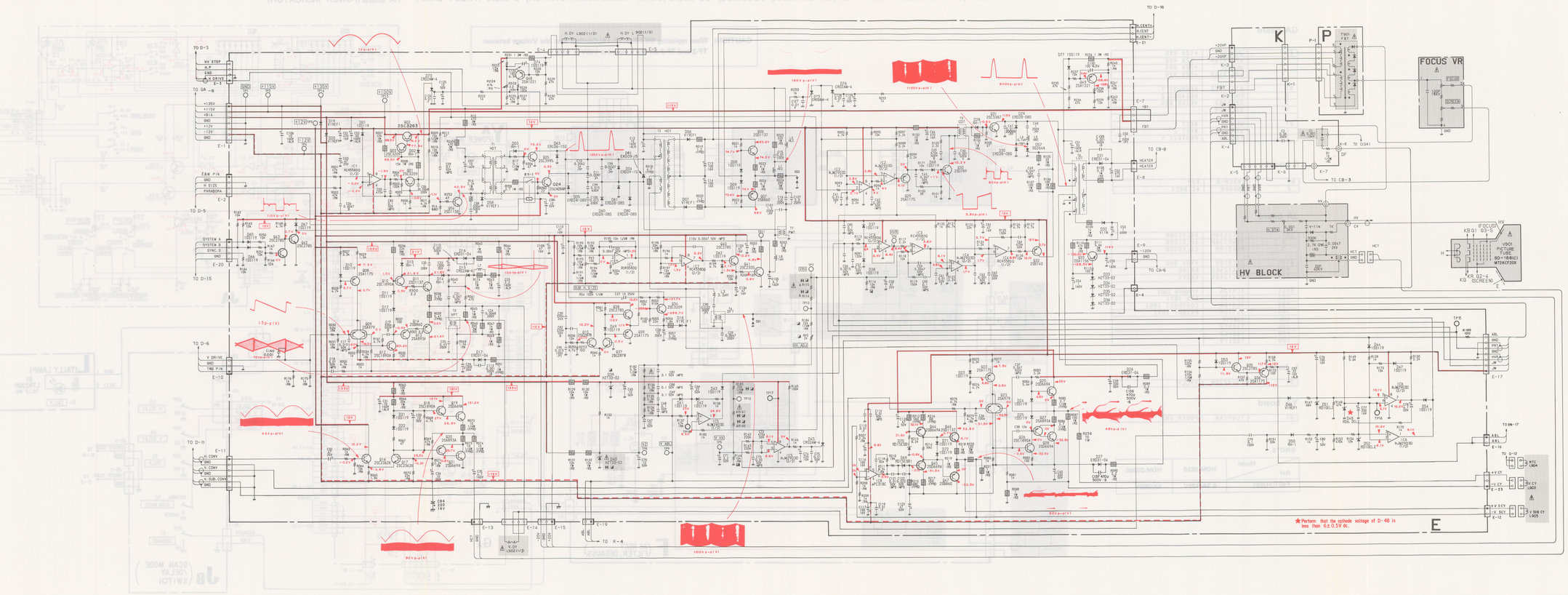
● : Conductor side pattern
● : Component side pattern

E board (H/V DEFLECTION OUTPUT, DYNAMIC FOCUS, ENT REG)

E, K, P E, K, P

K board (DYNAMIC FOCUS, CONNECTOR RELAY) P board (EHT TRANSFORMER)

E, K, P E, K, P



GA, F, JA, JB, L, YA GA, F, JA, JB, L, YA

GA board (+12V/−12V REG, DEGAUSS) F board (LINE FILTER, AC SUPP SW, DEGAUSS)
JA board (SIGNAL SELECT CONTRAST/BRIGHTNESS VOLUMES) JB board (SCAN MODE/DELAY SWITCH) L board (TALLY LAMP) YA board (POWER INDICATOR)

GA board

IC1	uPC7812H	+12V REG
2	uPC7912H	−12V REG
3	uPC7812H	+12V REG
4	uPC7912H	−12V REG
Q1	DTC124ES	DEGAUSS 1
2	DTA124ES	DEGAUSS 2
3	2SC3263	+BIAS REG
4	2SC3209	
D1	V19E	RECT 1
2	V19E	RECT 2
3	1SS119	PROTECT 1

F board

D1	CR3CM-8	OVP
2	RB406N	AC RECT

JA board

IC1	TC4053BP	SELECTOR
2	TC4053BP	SELECTOR
3	M54519P	SELECTOR
Q101	2SC2785	+10V REG
102	DTC124ES	DRIVE
103	DTC124ES	DRIVE
D101	TLY124	Y/PB/PR INDI
102	TLY124	RGB INDI
103	TLY124	CONTRAST INDI
104	TLY124	BRIGHT INDI
105	1SS119	
106	1SS119	
108	1SS119	
109	1SS119	

L board

D1	LT-9220H	TALLY

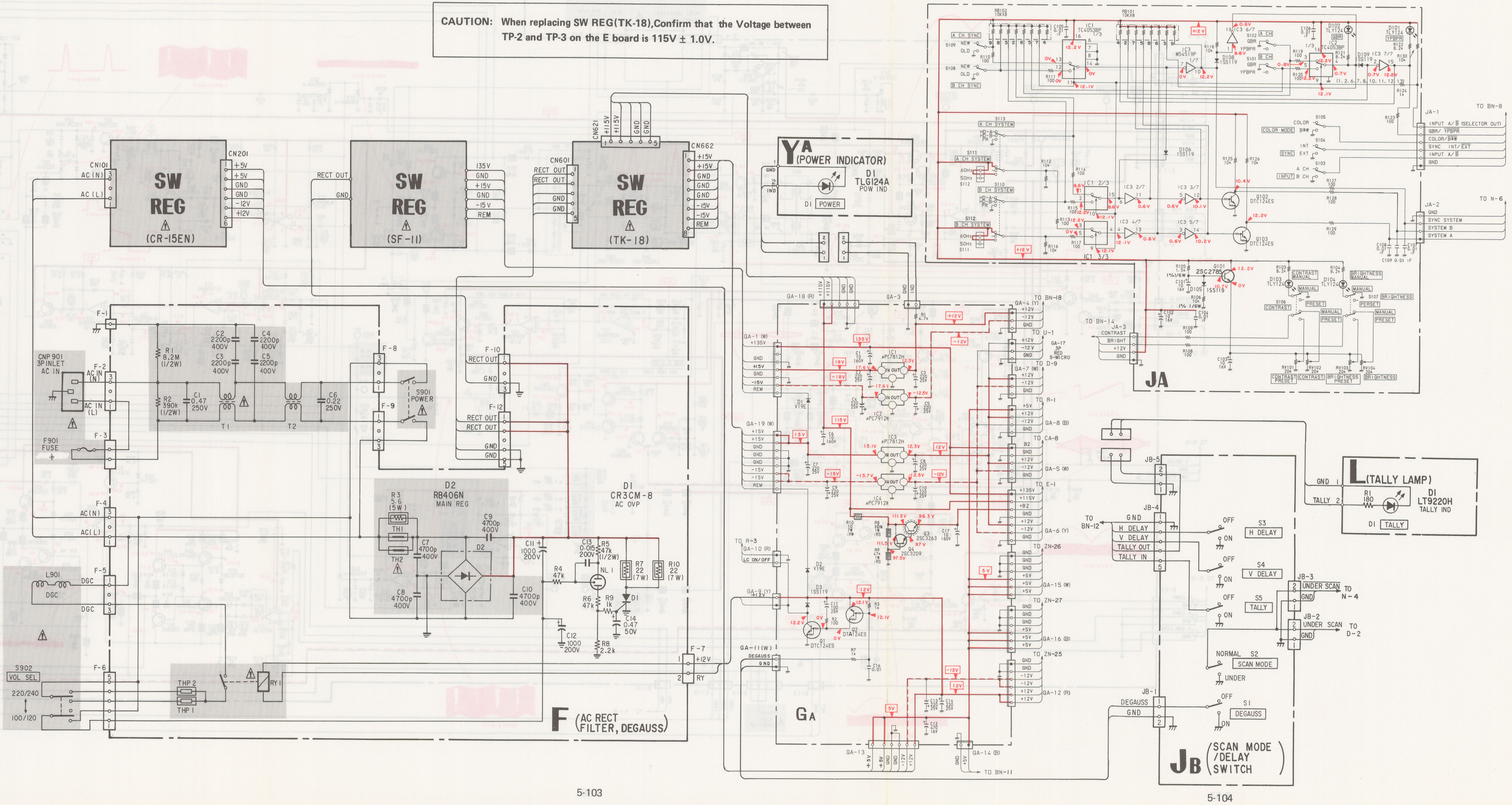
YA board

D1	TLG124A	POWER IND

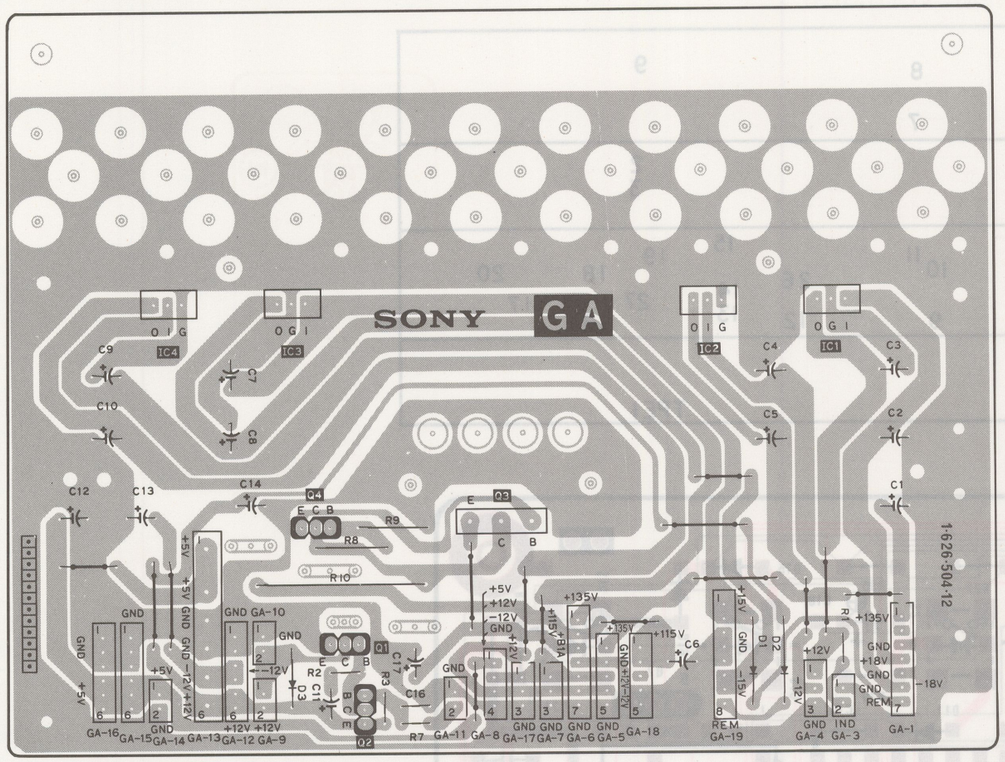
※NOTE

Ref \ Model	HDM-2830	HDM-2830E
F901(FUSE)	6.3A/125V	4A/250V

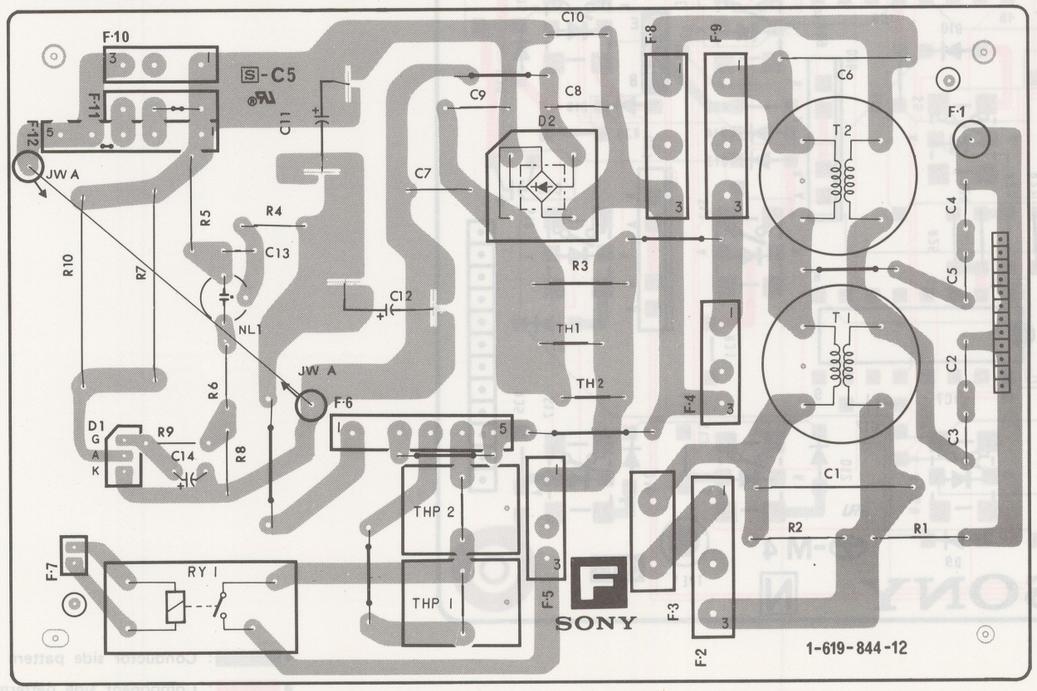
CAUTION: When replacing SW REG(TK-18),Confirm that the Voltage between TP-2 and TP-3 on the E board is 115V ± 1.0V.



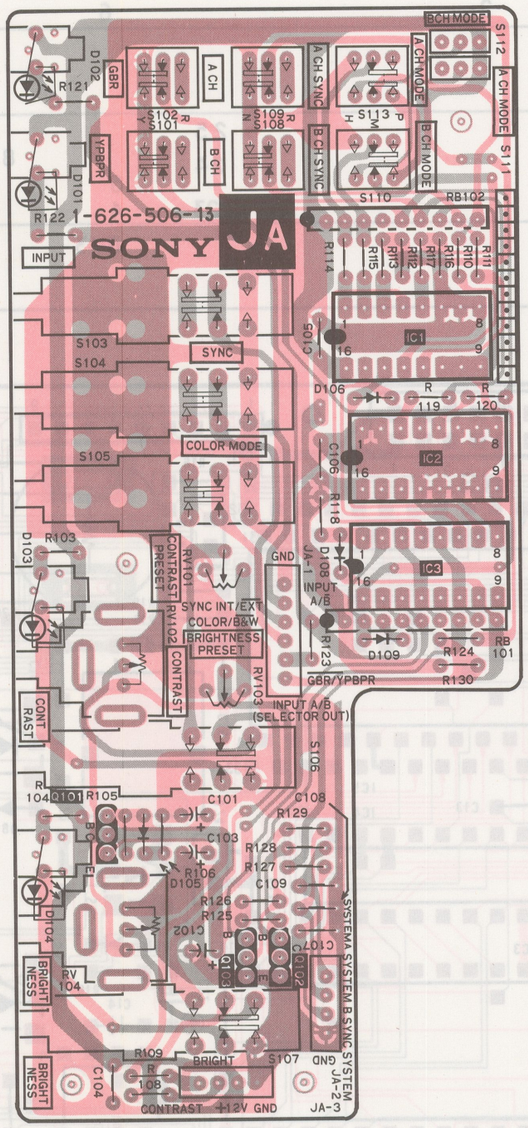
GA board (+12V/−12V REG, DEGAUSS)



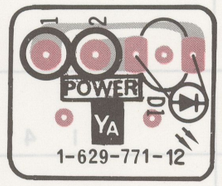
F board (LINE FILTER, AC SUPP SW, DEGAUSS)



JA board (SIGNAL SELECT CONTRAST/ BRIGHTNESS VOLUMES)

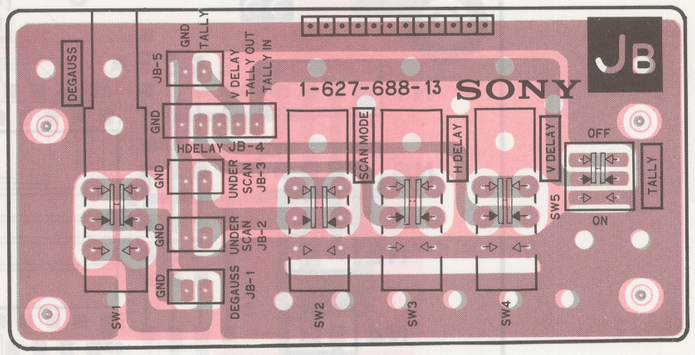


YA board (POWER INDICATOR)

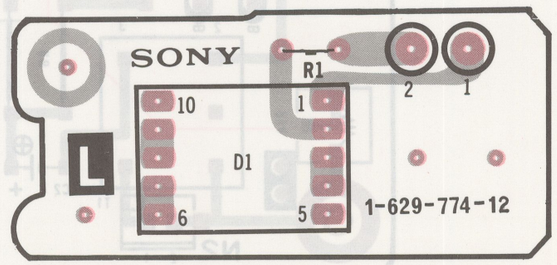


JB board (SCAN MODE/DELAY SWITCH)

1-598-933-12



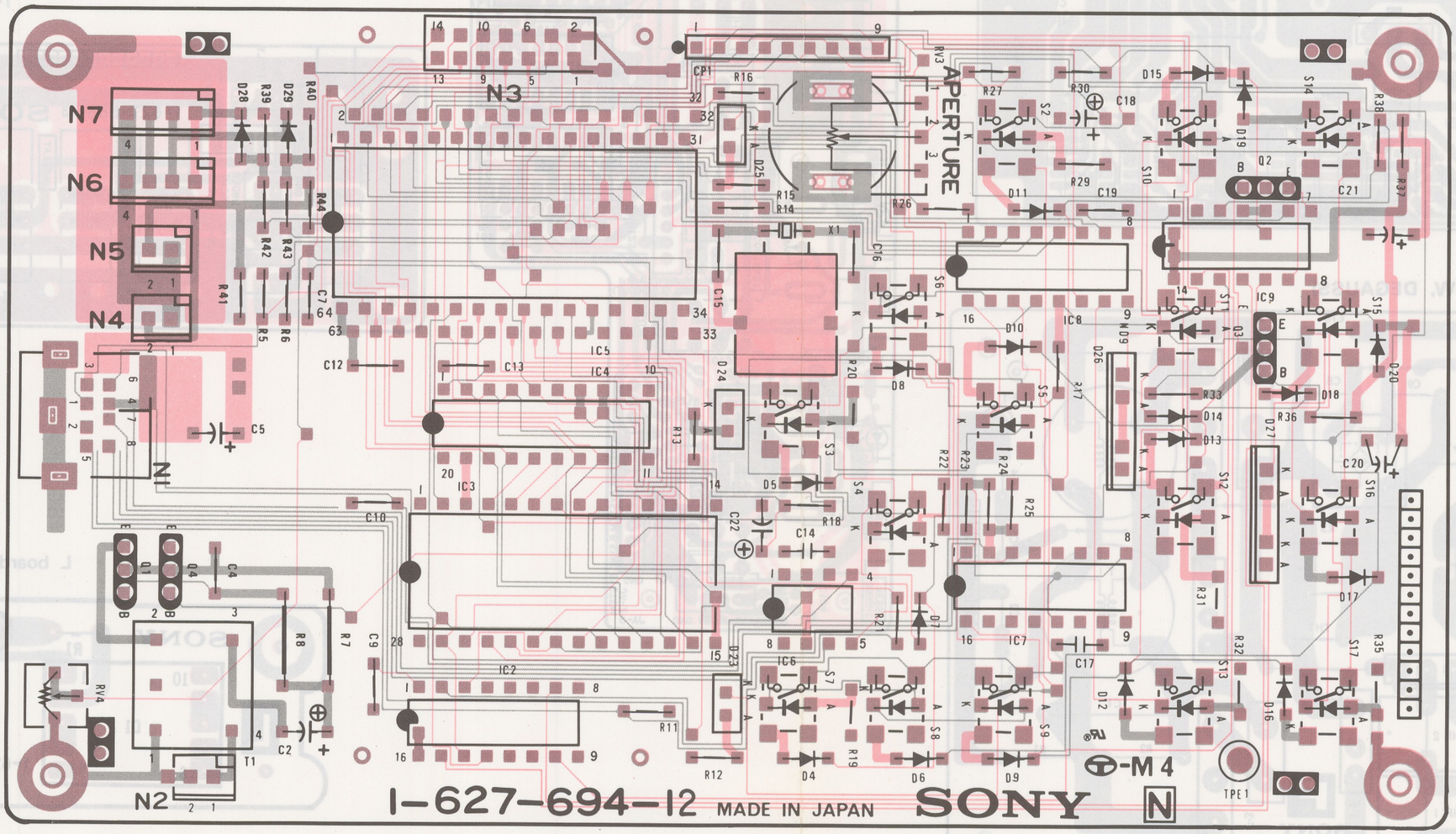
L board (TALLY LAMP)



• : Conductor side pattern
• : Component side pattern

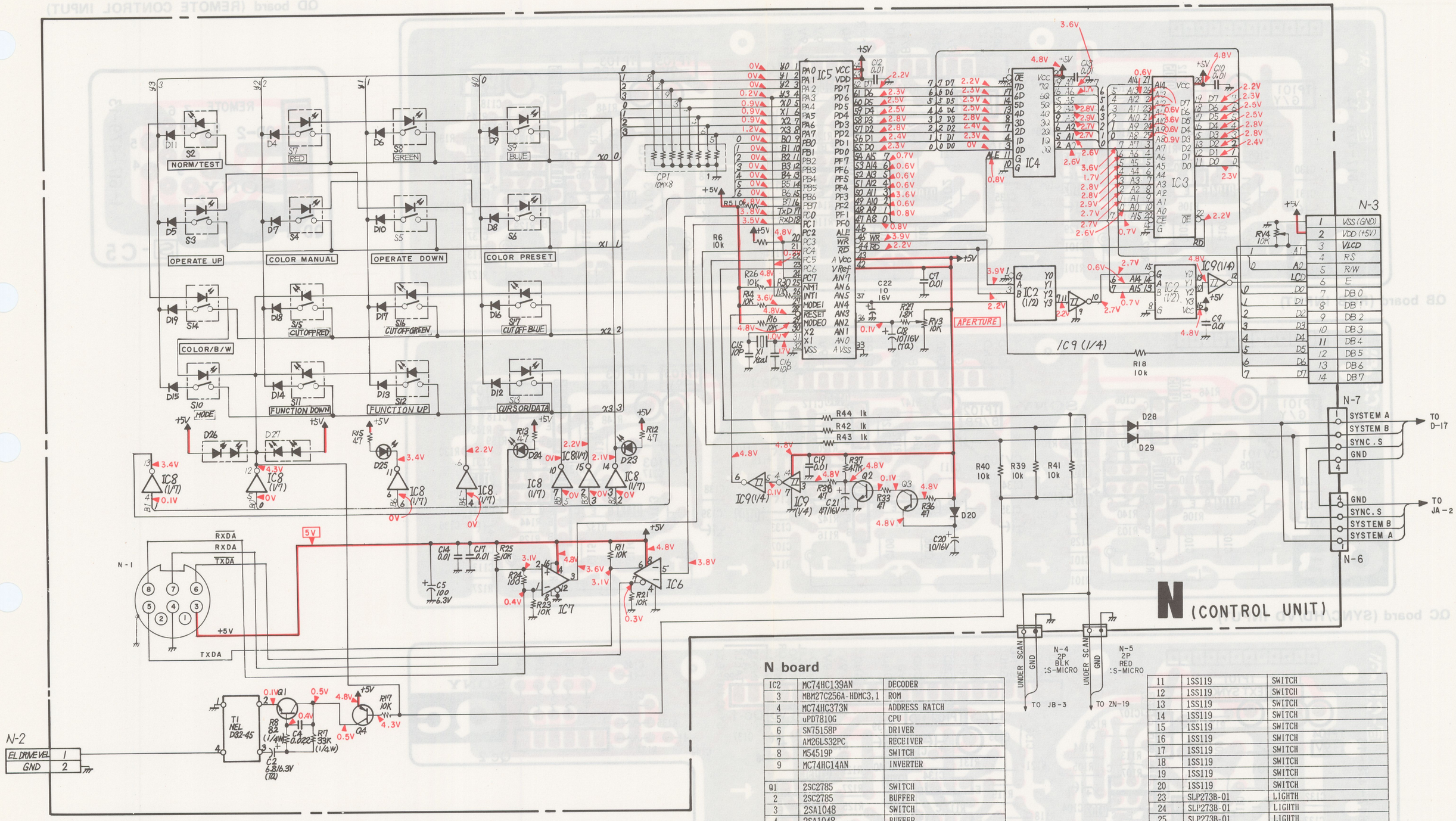
N board (CONTROL UNIT)

IC	5 4 3 2 6 8 7 9
Q	1 4 2 3
D	28 29 25 24 23 5 4 8 7 6 10 11 9 26 12 15 14 13 19 27 18 17 16 20
ADJ TP	RV4 RV3 TPE1



● : Conductor side pattern
● : Component side pattern

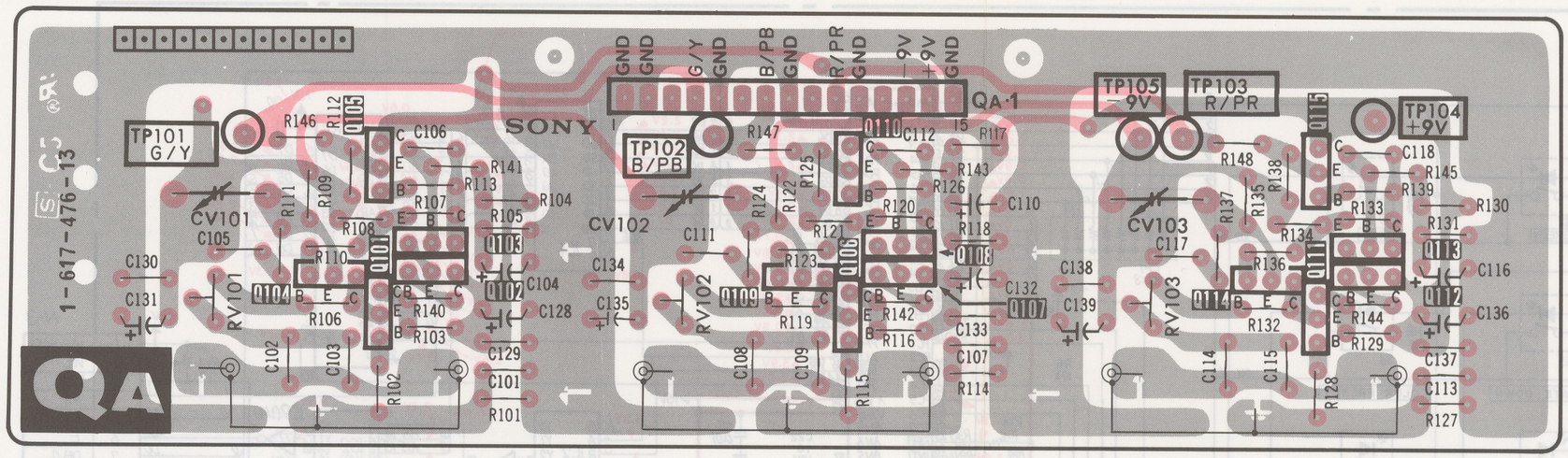
N board (CONTROL UNIT)



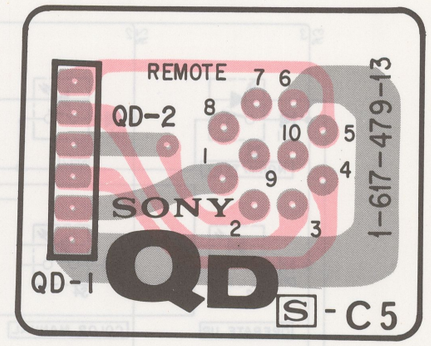
N board

IC2	MC74HC139AN	DECODER
3	MBM27C256A-HDMC3,1	ROM
4	MC74HC373N	ADDRESS RATCH
5	uPD7810G	CPU
6	SN75158P	DRIVER
7	AM26LS32PC	RECEIVER
8	M54519P	SWITCH
9	MC74HC14AN	INVERTER
Q1	2SC2785	SWITCH
2	2SC2785	BUFFER
3	2SA1048	SWITCH
4	2SA1048	BUFFER
D4	1SS119	SWITCH
5	1SS119	SWITCH
6	1SS119	SWITCH
7	1SS119	SWITCH
8	1SS119	SWITCH
9	1SS119	SWITCH
10	1SS119	SWITCH
11	1SS119	SWITCH
12	1SS119	SWITCH
13	1SS119	SWITCH
14	1SS119	SWITCH
15	1SS119	SWITCH
16	1SS119	SWITCH
17	1SS119	SWITCH
18	1SS119	SWITCH
19	1SS119	SWITCH
20	1SS119	SWITCH
23	SLP273B-01	LIGHTH
24	SLP273B-01	LIGHTH
25	SLP273B-01	LIGHTH
26	SLP271E	LIGHTH
27	SLP271E	LIGHTH
28	1SS119	SWITCH
29	1SS119	SWITCH

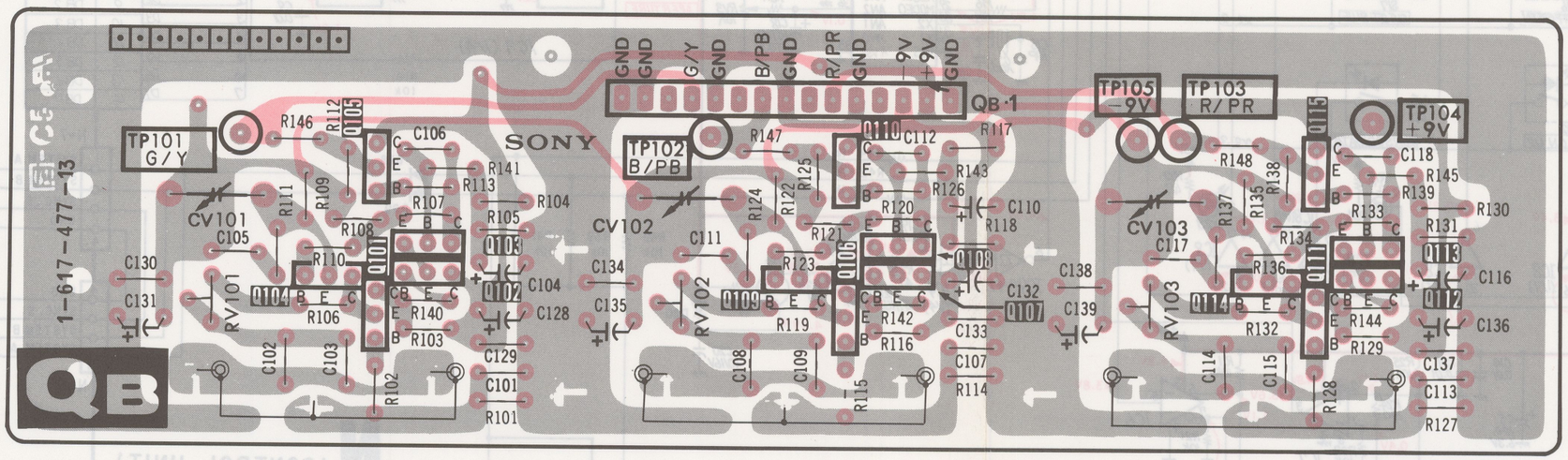
QA board (RGB INPUT)



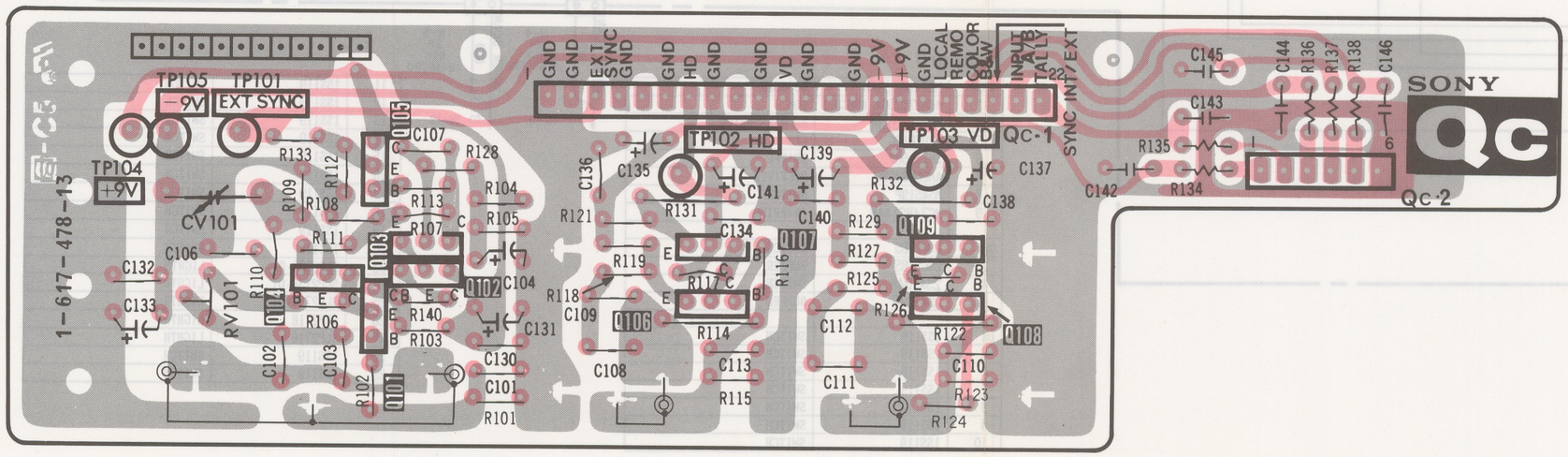
QD board (REMOTE CONTROL INPUT)



QB board (RGB INPUT)



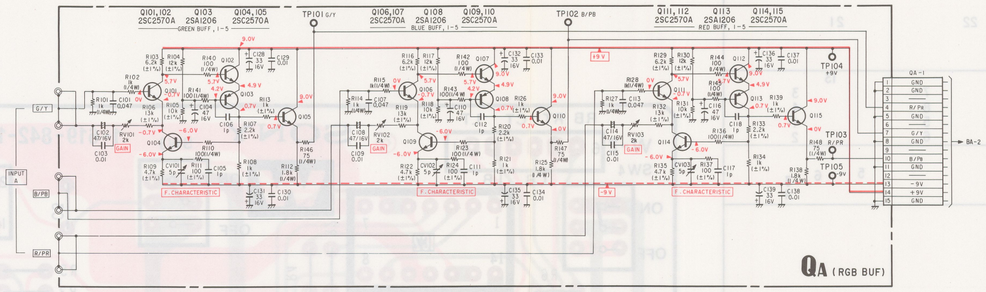
QC board (SYNC/HD/VD INPUT)

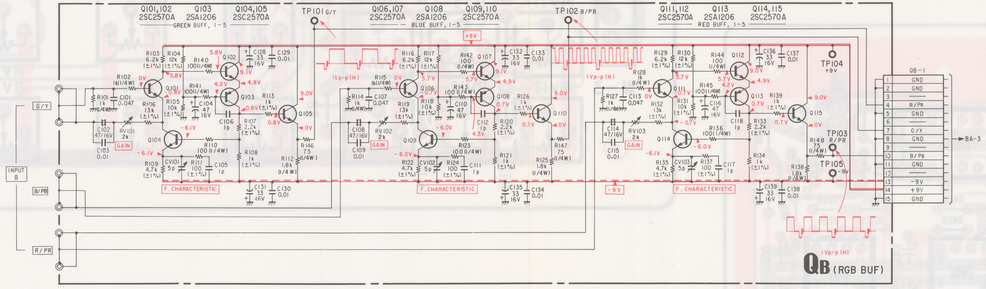


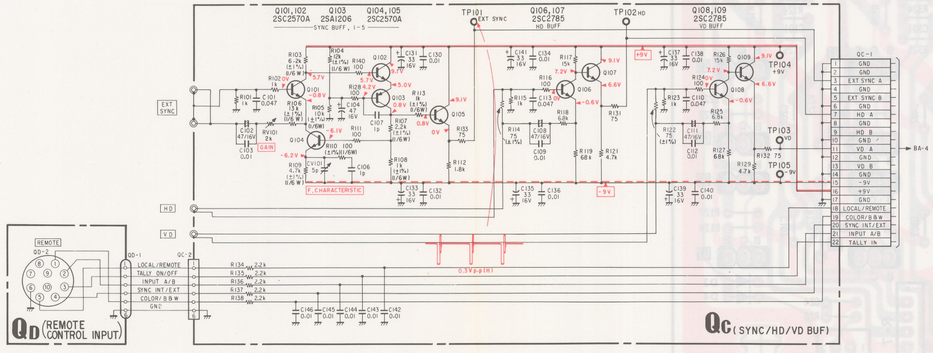
● : Conductor side pattern
● : Component side pattern

QA, QB, QC, QD

QA board (RGB INPUT) **QB board (RGB INPUT)** **QC board (EXT SYNC/HD/VD INPUT)** **QD board (REMOTE CONTROL INPUT)**







QA board

Q101	2SC2570A	RED BUFF.1
102	2SC2570A	RED BUFF.2
103	2SA1206	RED BUFF.3
104	2SC2570A	RED BUFF.4
105	2SC2570A	RED BUFF.5
106	2SC2570A	GREEN BUFF.1
107	2SC2570A	GREEN BUFF.2
108	2SA1206	GREEN BUFF.3
109	2SC2570A	GREEN BUFF.4
110	2SC2570A	GREEN BUFF.5
111	2SC2570A	BLUE BUFF.1
112	2SC2570A	BLUE BUFF.2
113	2SA1206	BLUE BUFF.3
114	2SC2570A	BLUE BUFF.4
115	2SC2570A	BLUE BUFF.5

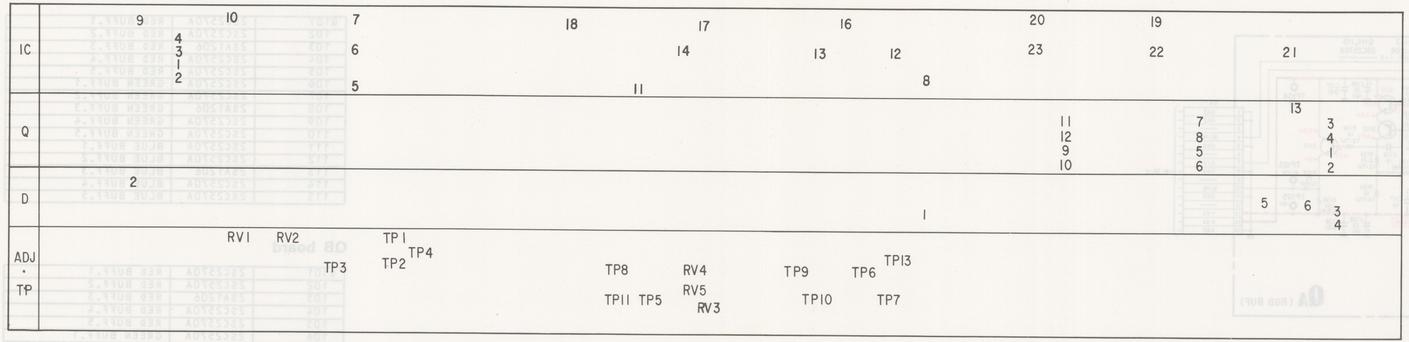
QB board

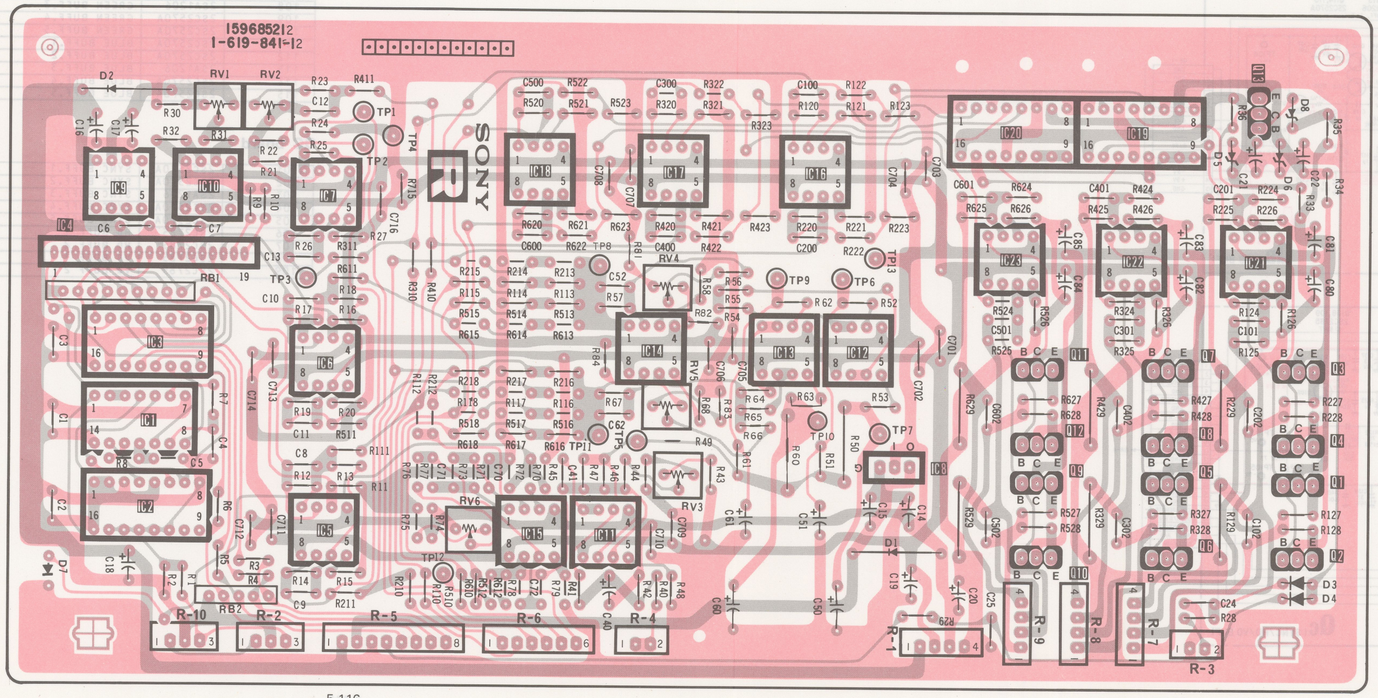
Q101	2SC2570A	RED BUFF.1
102	2SC2570A	RED BUFF.2
103	2SA1206	RED BUFF.3
104	2SC2570A	RED BUFF.4
105	2SC2570A	RED BUFF.5
106	2SC2570A	GREEN BUFF.1
107	2SC2570A	GREEN BUFF.2
108	2SA1206	GREEN BUFF.3
109	2SC2570A	GREEN BUFF.4
110	2SC2570A	GREEN BUFF.5
111	2SC2570A	BLUE BUFF.1
112	2SC2570A	BLUE BUFF.2
113	2SA1206	BLUE BUFF.3
114	2SC2570A	BLUE BUFF.4
115	2SC2570A	BLUE BUFF.5

QC board

Q101	2SC2570A	SYNC BUFF.1
102	2SC2570A	SYNC BUFF.2
103	2SA1206	SYNC BUFF.3
104	2SC2570A	SYNC BUFF.4
105	2SC2570A	SYNC BUFF.5
106	2SC2785	HD BUFF 1
107	2SC2785	HD BUFF 2
108	2SC2785	VD BUFF 1
109	2SC2785	VD BUFF 2

R board (LANDING CORRECTION)

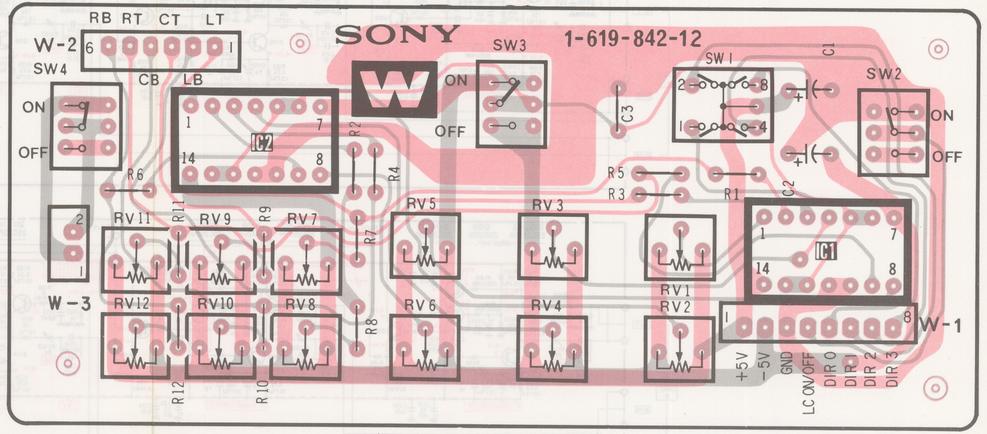




5-116

5-117

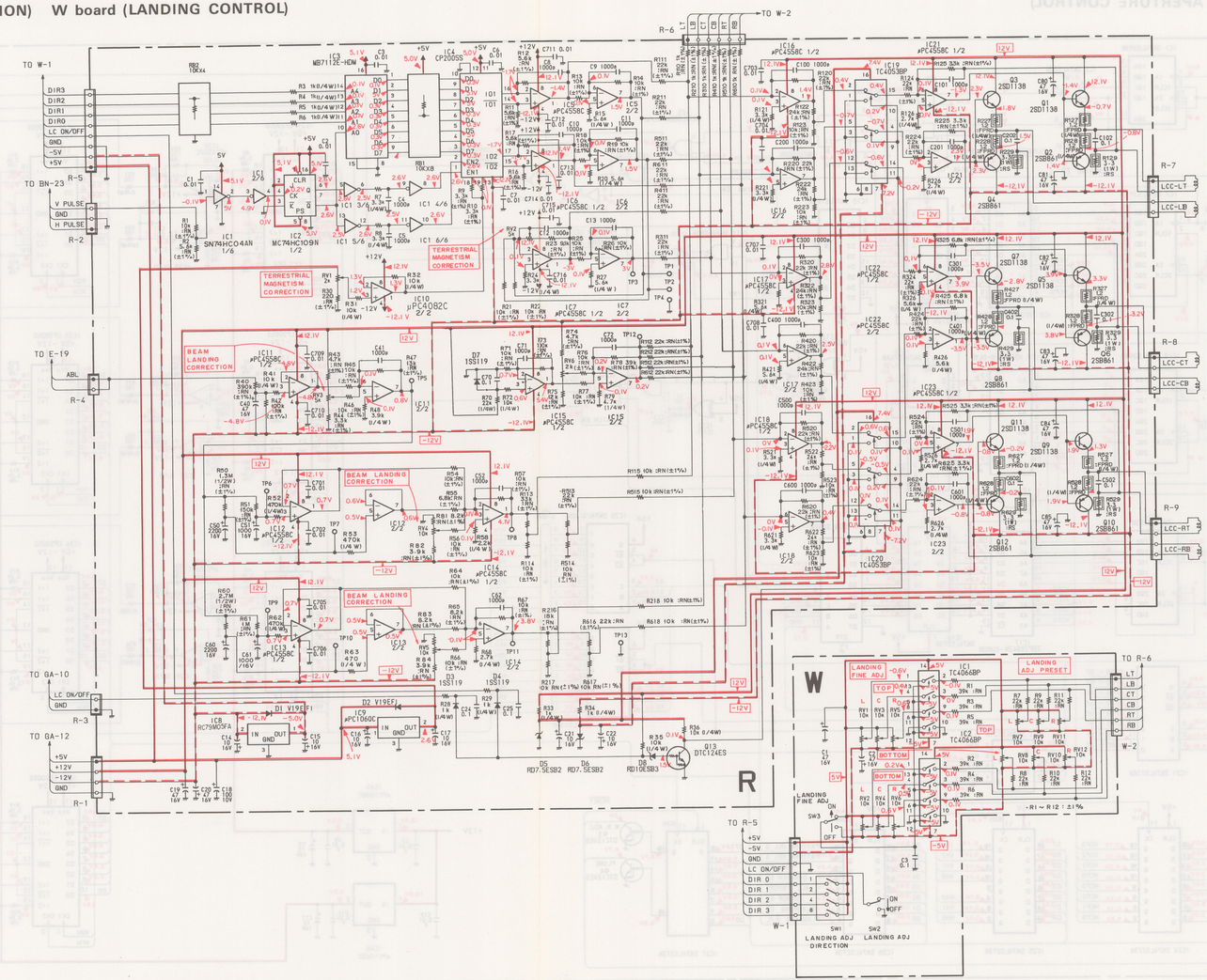
W board (LANDING CONTROL)



: Conductor side pattern
: Component side pattern

5-118

R board (LANDING CORRECTION) W board (LANDING CONTROL)



R board

IC1	MC74HC04AN	BUFFER
2	MC74HC04AN	FLIP FLOP
3	MB7112E-HDM	DATA MEMORY
4	CP2005S	LATCH & D/A
5	uPC4558C	D/A BUFFER & INVERTER 1
6	uPC4558C	D/A BUFFER & INVERTER 2
7	uPC4558C	SUM & INVERTER
8	RC79M05FA	-5V POWER SUPPLY
9	uPC1060C	D/A REF VOL
10	uPC4082C	REF V BUFFER
11	uPC4558C	BUFFER & AMP 1
12	uPC4558C	BUFFER 1
13	uPC4558C	BUFFER 2
14	uPC4558C	SUM AMP 1
15	uPC4558C	BUFFER & AMP 2
16	uPC4558C	SUM AMP 2
17	uPC4558C	SUM AMP 3
18	uPC4558C	SUM AMP 4
19	TC4053BP	SWITCH 1
20	TC4053BP	SWITCH 2
21	uPC4558C	OUTPUT STAGE DRIVE 1
22	uPC4558C	OUTPUT STAGE DRIVE 2
23	uPC4558C	OUTPUT STAGE DRIVE 3
Q1	2SD1138	LCC DRIVE OUT 1
2	2SB861	LCC DRIVE OUT 1
3	2SD1138	LCC DRIVE OUT 2
4	2SB861	LCC DRIVE OUT 2
5	2SD1138	LCC DRIVE OUT 3
6	2SB861	LCC DRIVE OUT 3
7	2SD1138	LCC DRIVE OUT 4
8	2SB861	LCC DRIVE OUT 4
9	2SD1138	LCC DRIVE OUT 5
10	2SB861	LCC DRIVE OUT 5
11	2SD1138	LCC DRIVE OUT 6
12	2SB861	LCC DRIVE OUT 6
13	DTC124ES	OUTPUT CONTROLE
D1	V19EF1	PROTECT 1
2	V19EF1	PROTECT 2
3	1SS119	SW1
4	1SS119	SW2
5	RD7.5ESB2	7.5V REG
6	RD7.5ESB2	-7.5V REG
7	1SS119	TEMP SENSER
8	RD1OES-B3	

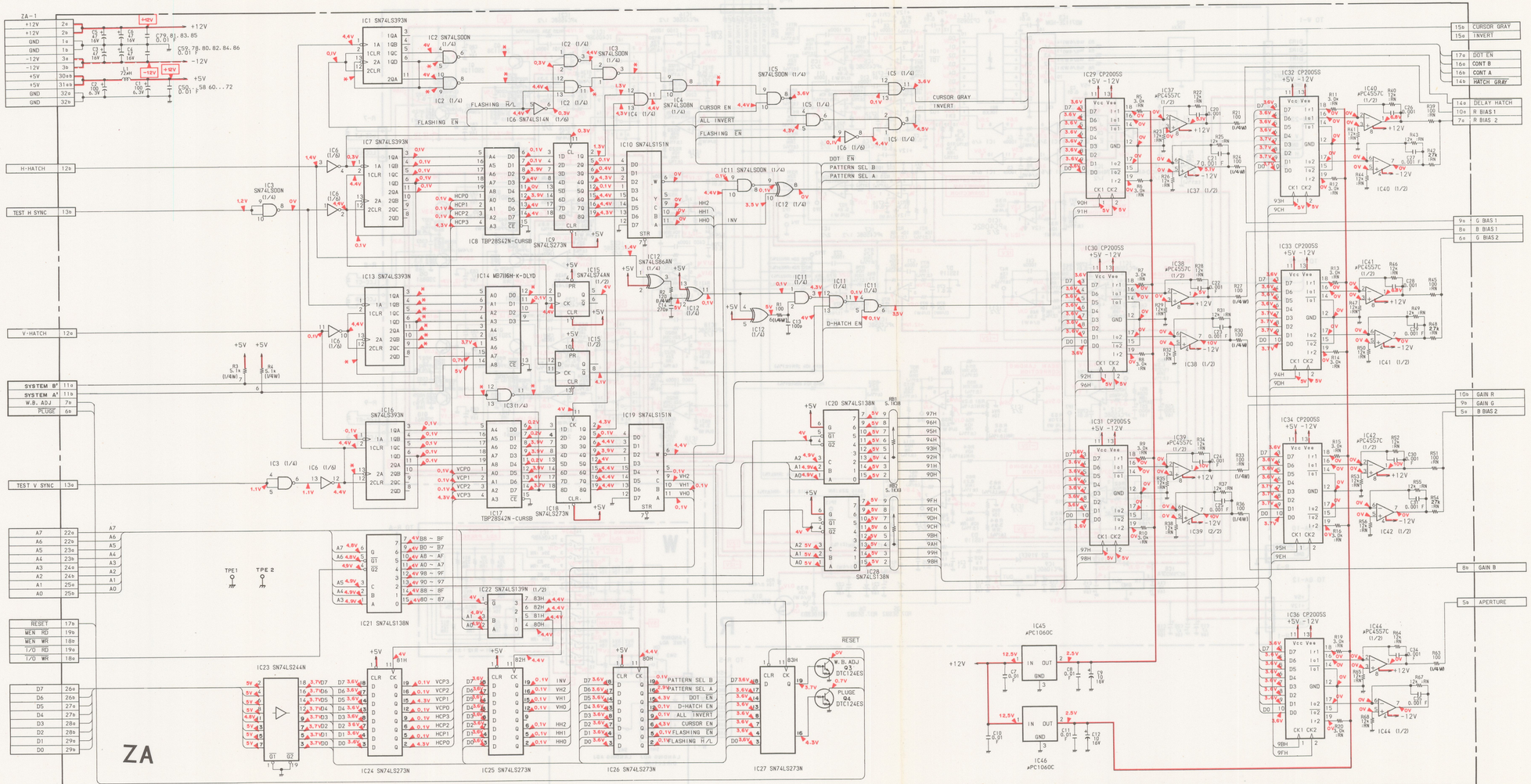
W board

IC1	TC4066BP	SWITCH 1
2	TC4066BP	SWITCH 2

ZA board

IC1	SN74LS393N	COUNTER
2	SN74LS00N	GATE
3	SN74LS00N	GATE
4	SN74LS08N	
5	SN74LS00N	GATE
6	SN74LS14N	
7	SN74LS393N	COUNTER
8	TBP28S42N-CURSB	TIMING GEN
9	SN74LS273N	LATCH
10	SN74LS151N	SELECTOR
11	SN74LS00N	GATE
12	SN74LS86AN	GATE
13	SN74LS393N	COUNTER
14	MB7116H-K-DLYD	V DELAY
15	SN74LS74AN	LATCH
16	SN74LS393N	COUNTER
17	TBP28S42N-CURSB	TIMING GEN
18	SN74LS273N	LATCH
19	SN74LS151N	SELECTOR
20	SN74LS138N	ADRS ENCODE 1
21	SN74LS138N	ADRS ENCODE 2
22	SN74LS139N	ADRS ENCODE 3
23	SN74LS244N	BUFFER
24	SN74LS273N	LATCH
25	SN74LS273N	LATCH
26	SN74LS273N	LATCH
27	SN74LS273N	LATCH
28	SN74LS138N	BUFFER
29	CP2005S	D/A
30	CP2005S	D/A
31	CP2005S	D/A
32	CP2005S	D/A
33	CP2005S	D/A
34	CP2005S	D/A
36	CP2005S	BUFFER
37	uPC4557C	BUFFER
38	uPC4557C	BUFFER
39	uPC4557C	BUFFER
40	uPC4557C	BUFFER
41	uPC4557C	VOLTAGE REF
42	uPC4557C	BUFFER
44	uPC4557C	BUFFER
45	uPC1060C	VOLTAGE REF
46	uPC1060C	VOLTAGE REF
Q3	DTC124ES	
4	DTC124ES	

ZA board (CURSOR GEN, SG CONTROL, W-BALANCE, APERTURE CONTROL)


ZA
H-MATCH
TEST H SYNC
V-MATCH
TEST V SYNC
SYSTEM B*
SYSTEM A*
W.B. ADJ
PLUGE
RESET
WEN RD
WEN WR
I/O RD
I/O WR
CURSOR GRAY
INVERT
CURSOR EN
ALL INVERT
FLASHING EN
DOT EN
PATTERN SEL B
PATTERN SEL A
D-HATCH EN
CURSOR GRAY
CURSOR EN
DOT EN
D-HATCH EN
ALL INVERT
FLASHING EN
CURSOR EN
PATTERN SEL B
PATTERN SEL A
DOT EN
INV
VHO
VH1
VH2
HHO
HH1
HH2
VCP0
VCP1
VCP2
VCP3
HCP0
HCP1
HCP2
HCP3
CURSOR GRAY
INVERT
CURSOR EN
ALL INVERT
FLASHING EN
DOT EN
PATTERN SEL B
PATTERN SEL A
D-HATCH EN
CURSOR EN
FLASHING H/L
FLASHING EN

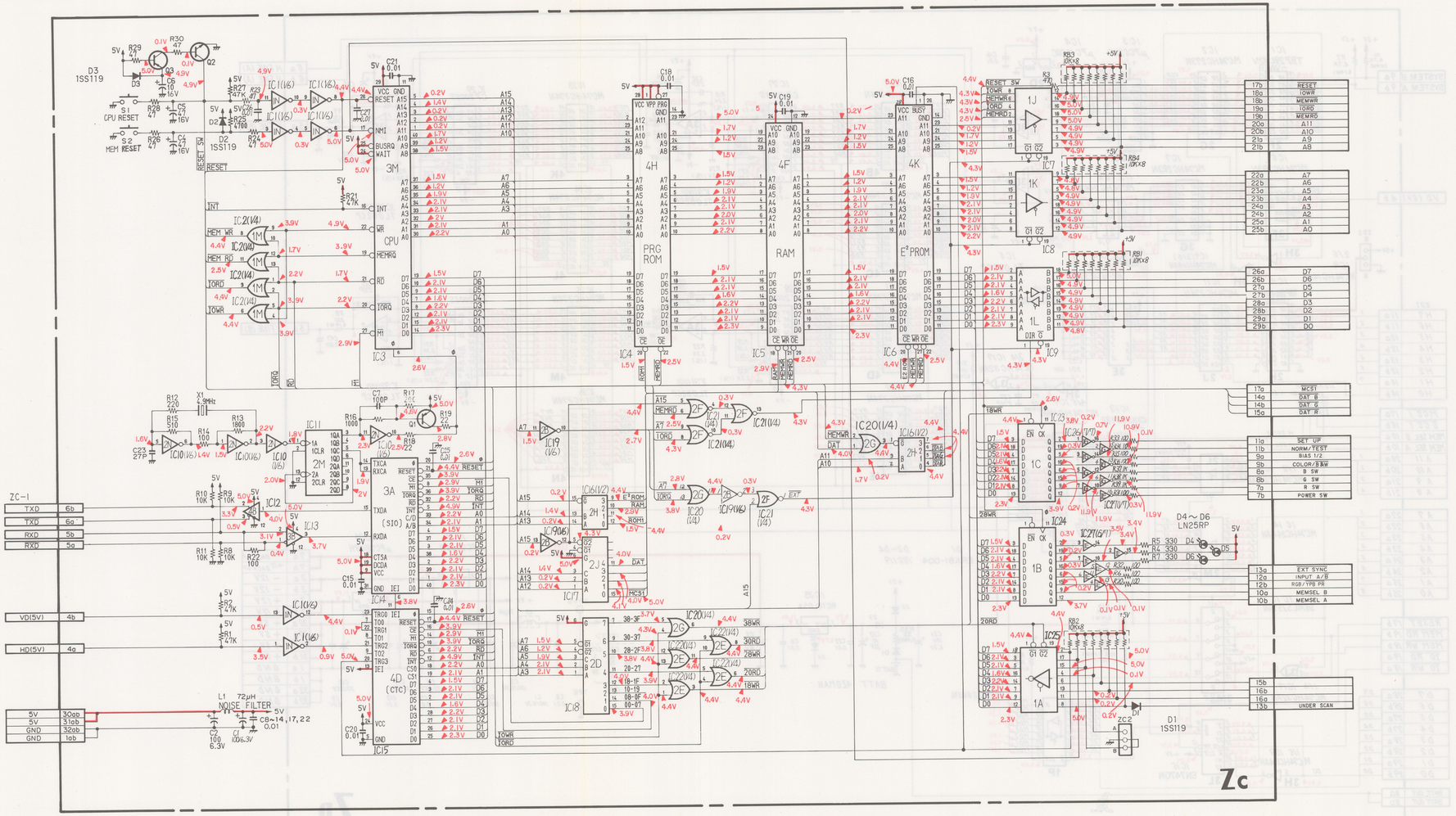
ZA board (CURSOR GEN, SG CONTROL, W-BALANCE, APERTURE CONTROL)

| | | |

ZC board (CPU/SYSTEM CONTROL)

| | | |

ZC board (CPU/SYSTEM CONTROL)



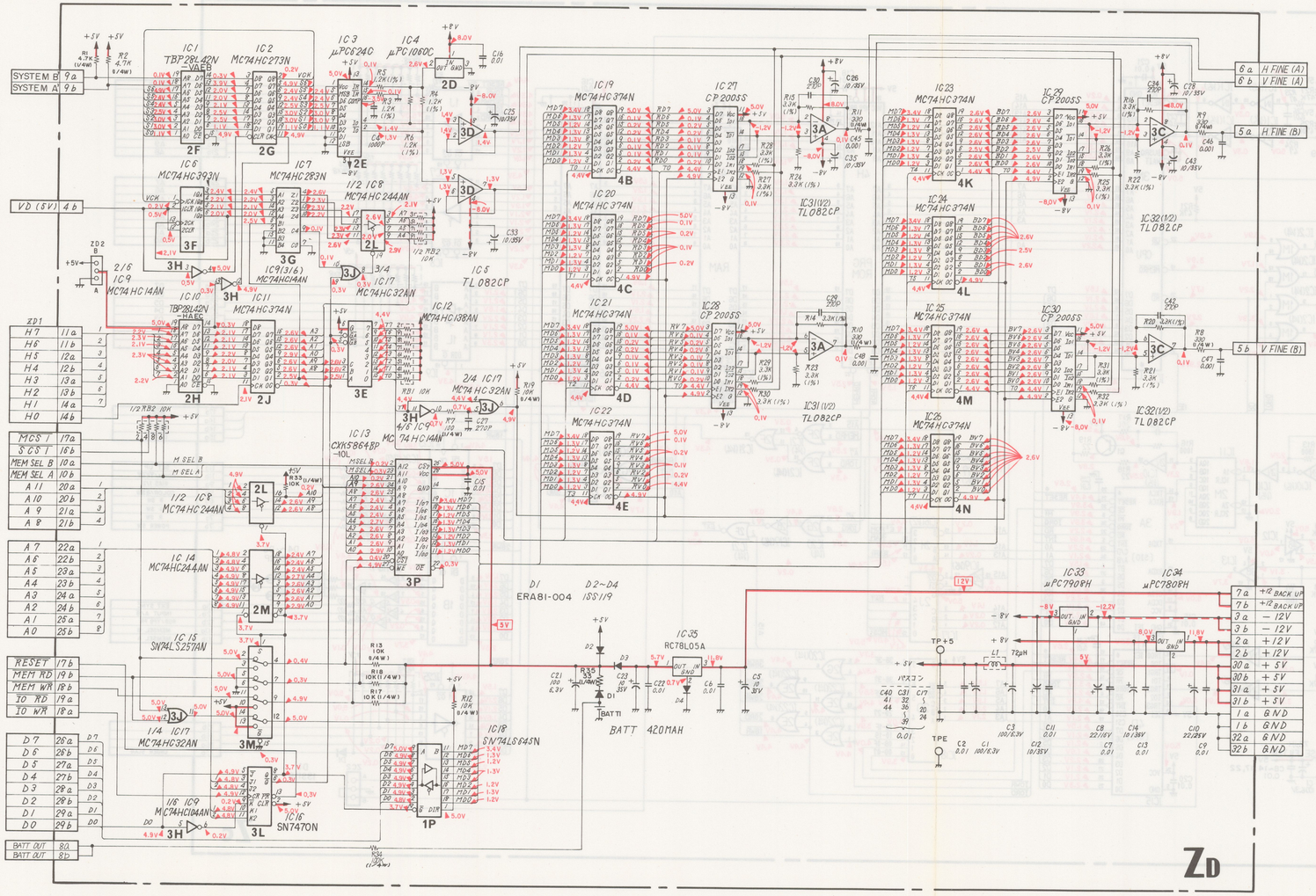
ZC board

IC1	SN74LS14N	
2	SN74LS32N	
3	LH0080A	
4	MBM2764-K-HDMH2.3	
5	CXK5816PN-12L	
6	HN58C65P-25	
7	SN74LS244N	
8	SN74LS244N	
9	SN74LS645N	
10	SN74LS04N	
11	SN74LS393N	
12	AM26LS31PC	
13	AM26LS32PC	
14	LH0084A	
15	LH0082AD	
16	SN74LS139N	
17	SN74LS138N	
18	SN74LS138N	
19	SN74LS04N	
20	SN74LS32N	
21	SN74LS02N	
22	SN74LS32N	
23	SN74LS377N	
24	SN74LS377N	
25	SN74LS240N	
26	M54519P	
27	M54519P	
Q1	2SA733	
2	2SC2458	
3	2SA733	
D1	1SS119	PROT 1
2	1SS119	PROT 2
3	1SS119	PROT 3
4	LN25RP	
5	LN25RP	
6	LN25RP	

ZD board

IC1	TBP28L42N-VAEB	V ADRS ENCODE
2	MC74HC273N	LATCH
3	uPC624C	D/A CONVERT
4	uPC1060C	VOLTAGE REF
5	TL082CP	VOLTAGE FOLLOWER
6	MC74HC393N	COUNTER
7	MC74HC283N	LATCH
8	MC74HC244AN	BUFFER
9	MC74HC14AN	INVERT
10	TBP2842N-HAEC	H ADRS ENCODE
11	MC74HC374N	LATCH
12	MC74HC138AN	ADRS
13	CXK5864BP-10L	MEMORY
14	MC74HC244AN	BUFFER
15	SN74LS257AN	SWITCH
16	SN7470N	LATCH
17	MC74HC32AN	GATE
18	SN74LS645N	BUFFER
19	MC74HC374N	LATCH
20	MC74HC374N	LATCH
21	MC74HC374N	LATCH
22	MC74HC374N	LATCH
23	MC74HC374N	LATCH
24	MC74HC374N	LATCH
25	MC74HC374N	LATCH
26	MC74HC374N	LATCH
27	CP2005S	D/A CONVERT
28	CP2005S	D/A CONVERT
29	CP2005S	D/A CONVERT
30	CP2005S	D/A CONVERT
31	TL082CP	I-V CONVERT
32	TL082CP	I-V CONVERT
33	uPC7908H	-8V REG
34	uPC7808H	+8V REG
35	uPC7808H	+5V REG
D1	ERA81-004	PROTECT 1
2	1SS119	PROTECT 2
3	1SS119	PROTECT 3
4	1SS119	PROTECT 4

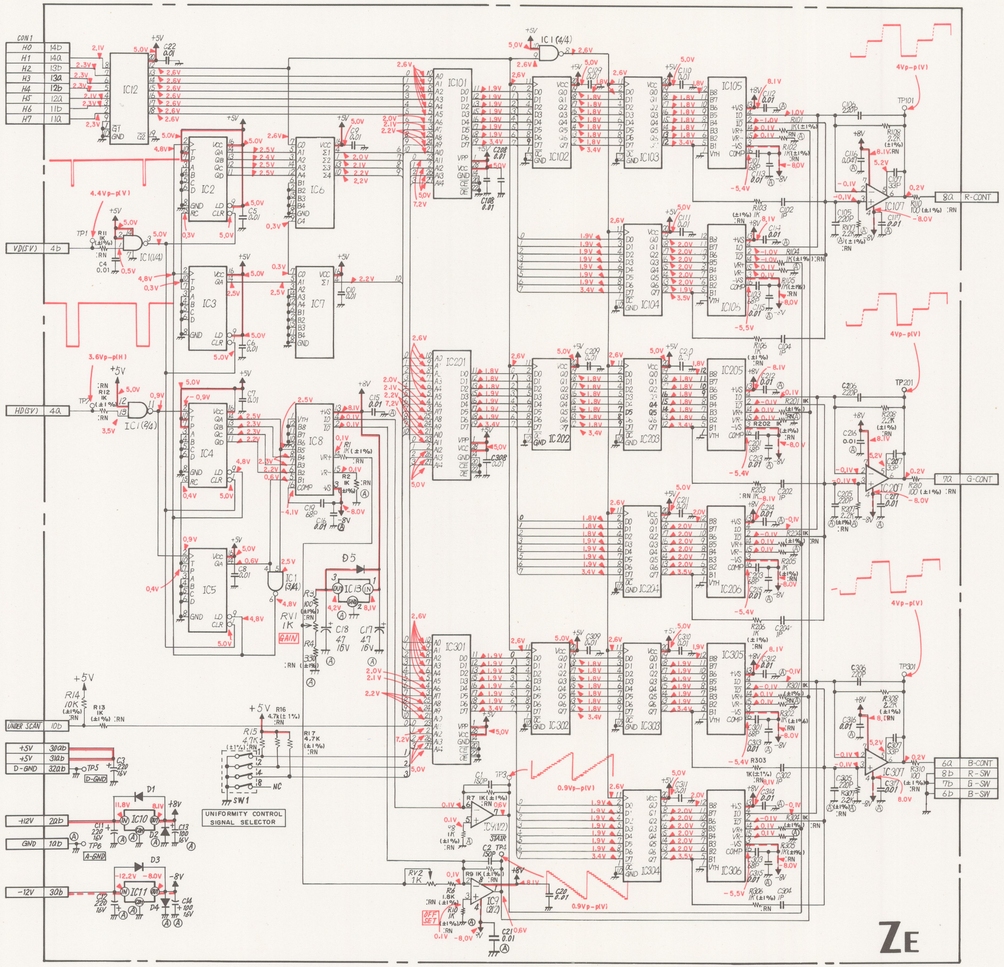
ZD board (DIGITAL CONVERGENCE)



ZD board (DIGITAL CONVERGENCE)

| | | |

ZE board (DIGITAL UNIFORMITY CONTROL)



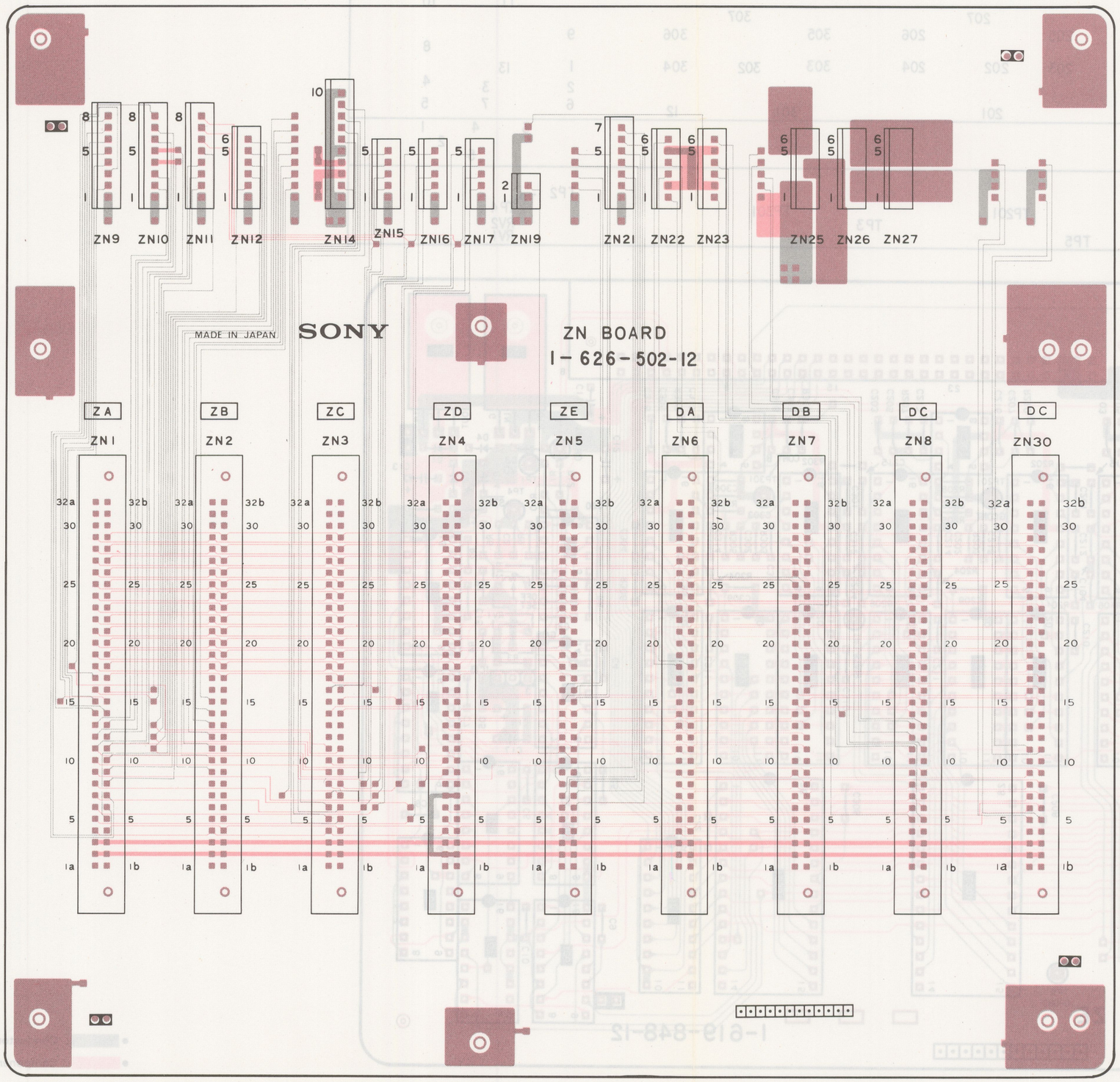
ZE board

IC1	TC74HC00P	NAND
2	TC74HC161P	ROW COUNTER (L)
3	TC74HC161P	ROW COUNTER (H)
4	TC74HC161P	RASTER ADRS COUNTER (L)
5	TC74HC161P	RASTER ADRS COUNTER (H)
6	SN74LS283N	ROW ADDER (L)
7	SN74LS283N	ROW ADDER (H)
8	DAC08HQ	RASTER ADRS DAC
9	TL072ACP	STAIR GEN
10	uPC7808H	+8V REG
11	uPC7908H	-8V REG
12	SN74HC541N	COLUMN BUFF
13	AN78L04	+4V REG
101	MBM27C256-25	R D.U.DT PROM
102	TC74HC574P	R HALF CLK DLY
103	TC74HC574P	R CURRENT DT LATCH
104	TC74HC574P	R NEXT DT LATCH
105	DAC08HQ	R CURRENT DT DAC
106	DAC08HQ	R NEXT DT DAC
107	LM318P	R I/V CONV
201	MBM27C256-25	G D.U.DT PROM
202	TC74HC574P	G HALF CLK DLY
203	TC74HC574P	G CURRENT DT LATCH
204	TC74HC574P	G NEXT DT LATCH
205	DAC08HQ	G CURRENT DT DAC
206	DAC08HQ	G NEXT DT DAC
207	LM318P	G I/V CONV
301	MBM27C256-25	B D.U.DT PROM
302	TC74HC574P	B HALF CLK DLY
303	TC74HC574P	B CURENT DT LATCH
304	TC74HC574P	B NEXT DT LATCH
305	DAC08HQ	B CURRENT DT LATCH
306	DAC08HQ	B NEXT DT DAC
307	LM318P	B I/V CONV
D1	1SS119	REG PROT
2	1SS119	REG PROT
3	1SS119	REG PROT
4	1SS119	REG PROT
5	1SS119	REG PROT

ZE board (DIGITAL UNIFORMITY CONTROL)

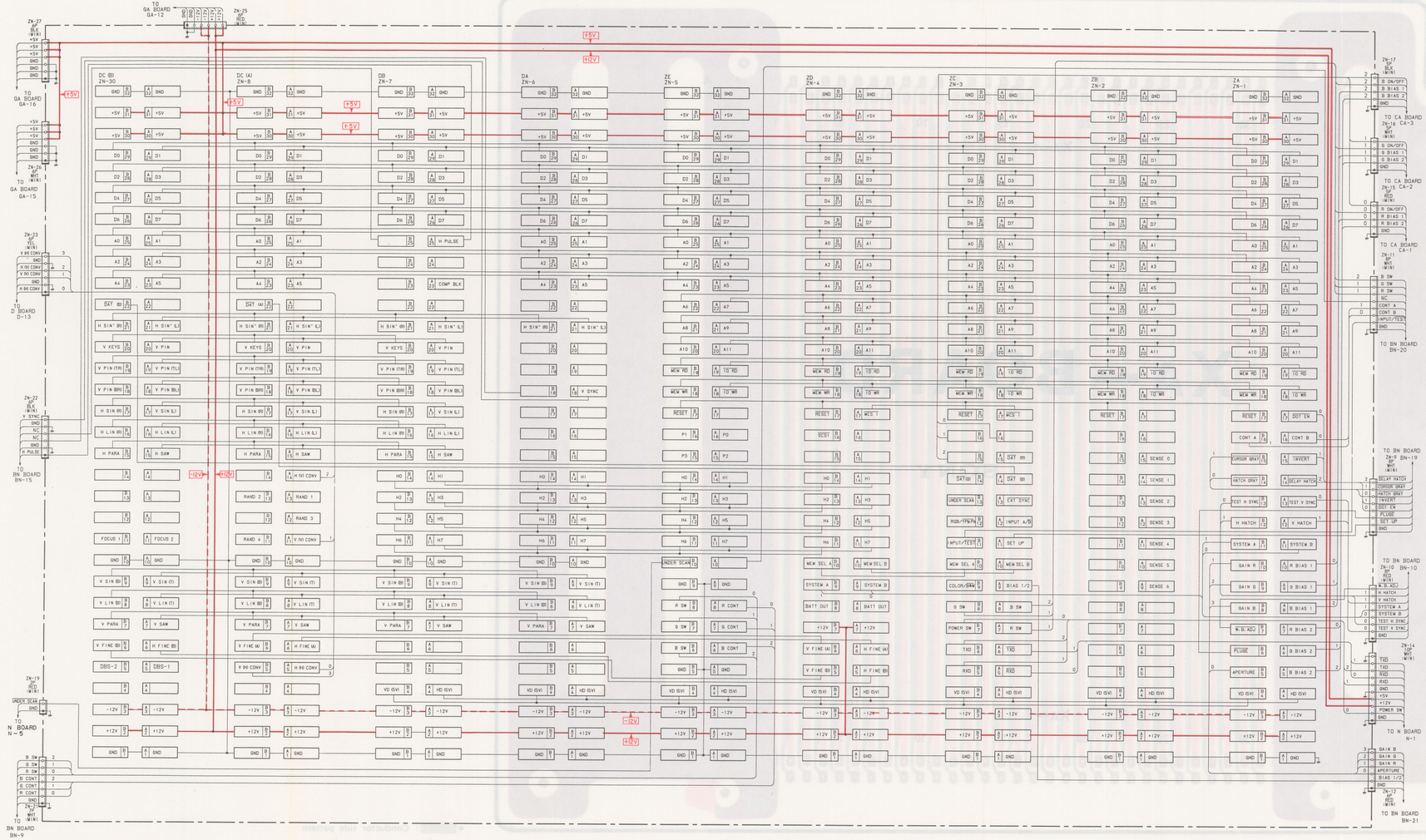
| | | |

ZN board (MOTHER BOARD)

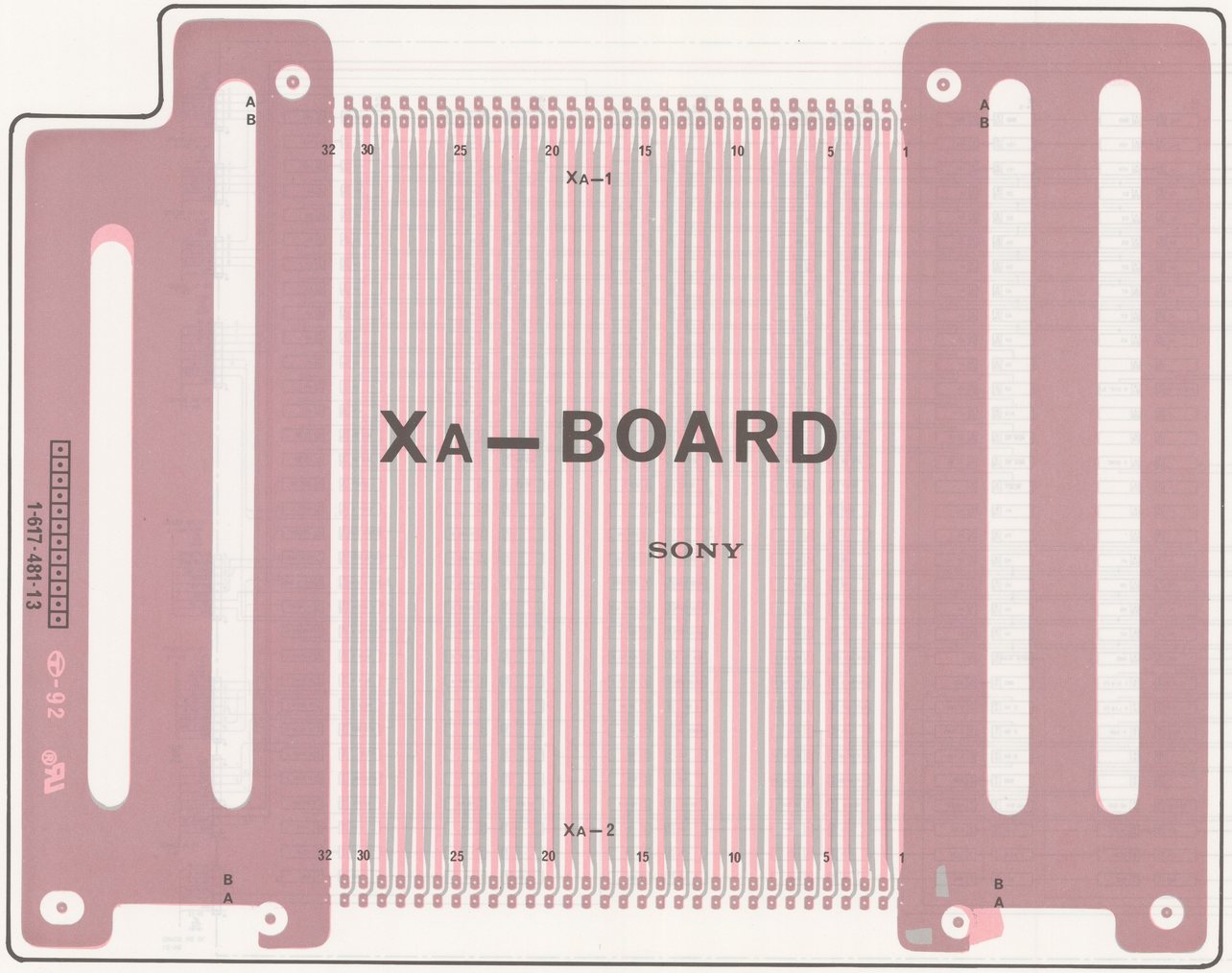


● : Conductor side pattern
● : Component side pattern

ZN board (CONTROL SYSTEM MOTHER BOARD)



XA board (EXTENSION BOARD)



: Conductor side pattern
: Component side pattern

XA XA

5-4. SEMICONDUCTORS

The chart in this section may sometimes show diodes, transistors, and ICs that are not interchangeable. When replacing a component, be sure to refer to the parts list.
The circuit diagram of each IC is obtained from the IC data book published by the manufacturer.

TYPE	PAGE	TYPE	PAGE	TYPE	PAGE
1S1555	5-172	2SC3263	5-172	GL3HY8	5-172
1SS119	5-172	2SC3263-0	5-172	HN58C65P-25	5-154
1SS83	5-172	2SC3387	5-172	HZT33-02	5-172
2SA1005	5-172	2SC3387-01AB	5-172	LA7016	5-171
2SA1005-K	5-172	2SC3595	5-172	LH0080A	5-154
2SA1048	5-172	2SC3595-D	5-172	LH0082AD	5-155
2SA1156	5-172	2SC3600	5-172	LH0084A	5-155
2SA1156-2L	5-172	2SC3600-E	5-172	LM2903DQ	5-156
2SA1175	5-172	2SC3601	5-172	LM318P	5-156
2SA1175-HFE	5-172	2SC3601-E	5-172	LM7805N	5-171
2SA1206	5-172	2SC3623A-L	5-172	LM7812CT	5-171
2SA1206-K1	5-172	2SC3995	5-172	LM7912CT	5-171
2SA1208	5-172	2SC4054	5-172	LT-9220H	5-172
2SA1221	5-172	2SC4054P	5-172	M5230L-A	5-156
2SA1221-L	5-172	2SD1137	5-172	M54519P	5-171
2SA1282-F	5-172	2SD1138	5-172	M5F7805N	5-171
2SA1406	5-172	2SD1138-C	5-172	MB7112E	5-156
2SA1406-E	5-172	2SD669A	5-172	MB7112E-HDM	5-171
2SA1407	5-172	2SD669A-C	5-172	MB7116H	5-156
2SA1407-D	5-172	2SD788	5-172	MB7116H-K-COMPH	5-171
2SA733	5-172	2SD788-3	5-172	MB7116H-K-DLYD	5-171
2SA733-K	5-172	2SD788-5	5-172	MB7116H-K-PTD	5-171
2SA893A	5-172	2SD789	5-172	MB7138E	5-157
2SA893A-E	5-172	2SD789-34	5-172	MB7138E-HSGH	5-171
2SA979	5-172	2SK125	5-172	MB84051B	5-157
2SA979-G	5-172	2SK125-4	5-172	MBM2764-K-HDMH2.3	5-171
2SB649A	5-172	2SK125-5	5-172	MBM2764-VSGH	5-171
2SB649A-C	5-172	2SK523	5-172	MBM27C256A-25	5-157
2SB739	5-172	2SK523-L1	5-172	MBM27C256A-25CZ	5-171
2SB740	5-172	2SK523-L2	5-172	MBM27C256A-K-HDMC3.2	5-171
2SB740-3	5-172	AM26LS31PC	5-153		
2SB860	5-172	AM26LS32PC	5-153	MC14053BCP	5-158
2SB861	5-172	AN78L04	5-153	MC1495L	5-158
2SB861-C	5-172	BX1190	5-153	MC1496P	5-158
2SC1890A	5-172	BX-1313	5-171	MC1595L	5-158
2SC1890A-E	5-172	BX-1314	5-171	MC4024P	5-171
2SC2026	5-172	BX-1315	5-171	MC4044P	5-158
2SC2026L	5-172	CP2005S	5-171	MC4053BCP	5-171
2SC2335	5-172	CR02AM-4	5-172	MC74HC00AN	5-158
2SC2335-K	5-172	CR02AM-8	5-172	MC74HC04AN	5-159
2SC2362K	5-172	CX718D-1	5-171	MC74HC109N	5-159
2SC2362K-G	5-172	CXK5816PN-12L	5-153	MC74HC112N	5-159
2SC2458	5-172	CXK5864BP	5-171	MC74HC132AN	5-171
2SC2471	5-172	CXK5864BP-10L	5-171	MC74HC138AN	5-159
2SC2551	5-172	DAC08HQ	5-154	MC74HC139AN	5-159
2SC2570A	5-172	DTA124ES	5-172	MC74HC14AN	5-171
2SC2603	5-172	DTC114ES	5-172	MC74HC153N	5-159
2SC2785	5-172	DTC124ES	5-172	MC74HC161N	5-160
2SC2785-E	5-172	ERA81-004	5-172	MC74HC193N	5-160
2SC2785-HFE	5-172	ERC06-15	5-172	MC74HC244AN	5-160
2SC2812-L5L6-TA	5-172	ERC06-15S	5-172	MC74HC273N	5-160
2SC2878	5-172	ERC38-06	5-172	MC74HC283N	5-160
2SC2878-B	5-172	ERD09-15	5-172	MC74HC32AN	5-161
2SC3209	5-172	ERD28-08S	5-172	MC74HC373N	5-161
2SC3209-LK	5-172	ERD31-04	5-172	MC74HC374AN	5-171
				MC74HC393N	5-161

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MC74HC541H	5-171
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MC74HC74N	5-162
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SN7470N	5-171
SN74HC04N	5-159
SN74HC05N	5-163
SN74HC139AN	5-171
SN74HC153N	5-159
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SN74HC193N	5-160
SN74HC273N	5-160
SN74HC36N	5-163
SN74HC373N	5-161
SN74HC374N	5-164
SN74HC393N	5-161
SN74HC541N	5-164
SN74LS00N	5-164
SN74LS02N	5-164
SN74LS04N	5-164
SN74LS08N	5-164
SN74LS137N	5-164
SN74LS138N	5-165
SN74LS139AN	5-171
SN74LS14N	5-165
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SN74LS161AN	5-165
SN74LS163AN	5-165
SN74LS175N	5-166
SN74LS240N	5-166
SN74LS244N	5-166
SN74LS247-AN	5-171
SN74LS257AN	5-166
SN74LS273N	5-166
SN74LS283N	5-166
SN74LS32N	5-167
SN74LS377N	5-167
SN74LS393N	5-167
SN74LS645N	5-167
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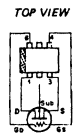
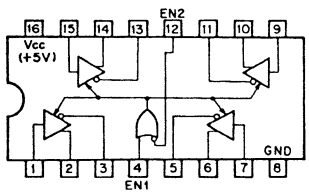


AM26LS31PC (ADVANCED MICRO DEVICES)

HIGH SPEED DIFFERENTIAL LINE DRIVER

– TOP VIEW –



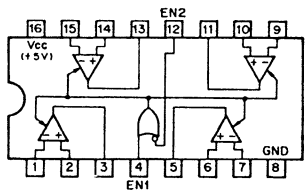
FUNCTION TABLE		
EN2	EN1	OUTPUT
0	0	ENABLE
0	1	ENABLE
1	0	HI-Z
1	1	ENABLE

0 ; LOW LEVEL
1 ; HIGH LEVEL
HI-Z ; HIGH IMPEDANCE

AM26LS32PC (ADVANCED MICRO DEVICES)

HIGH SPEED DIFFERENTIAL LINE RECEIVER

– TOP VIEW –



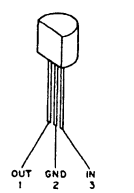
FUNCTION TABLE		
EN2	EN1	OUTPUT
0	0	ENABLE
0	1	ENABLE
1	0	HI-Z
1	1	ENABLE

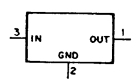
0; LOW LEVEL
1 ; HIGH LEVEL
HI-Z ; HIGH IMPEDANCE

	SENSE	INPUT VOLT
LS32	±200mV	± 7V
LS33	±500mV	±15V

AN78L04 (MATSUSHITA) + 4V
RC78L05A (RAYTHEON) + 5V
RC78L08A (RAYTHEON) + 8V
RC78L09A (RAYTHEON) + 9V

POSITIVE VOLTAGE REGULATOR (100mA)

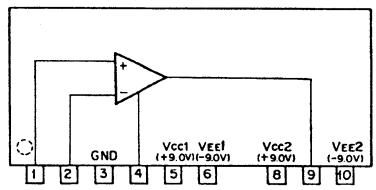




BX1190 (SONY)

VIDEO AMPLIFIER

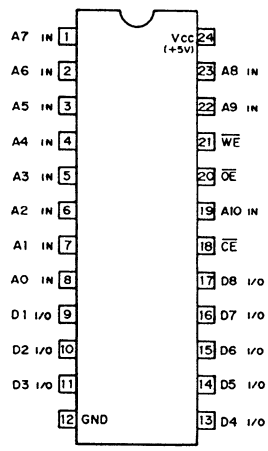
– REAR VIEW –

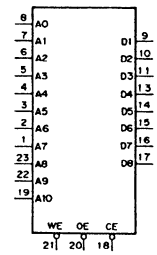


CXK5816PN-12L (SONY) (ACCESS TIME = 120nS)

C-MOS 16384-BIT (2048x8) STATIC RAM

– TOP VIEW –

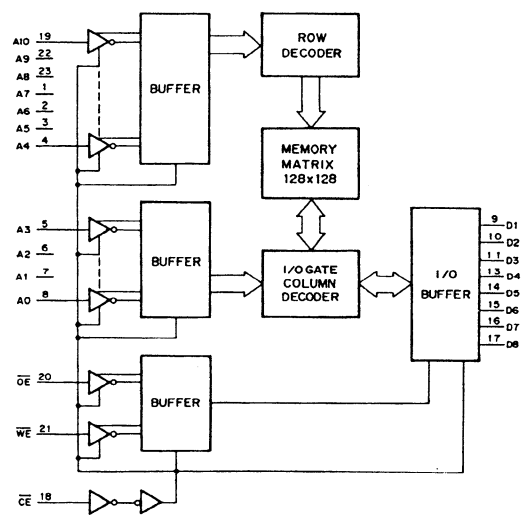




A0 – A10 ; ADDRESS INPUTS
$\overline{CE}$; CHIP ENABLE
D1 – D8 ; DATA INPUTS/OUTPUTS
$\overline{OE}$; OUTPUT ENABLE
$\overline{WE}$; WRITE ENABLE

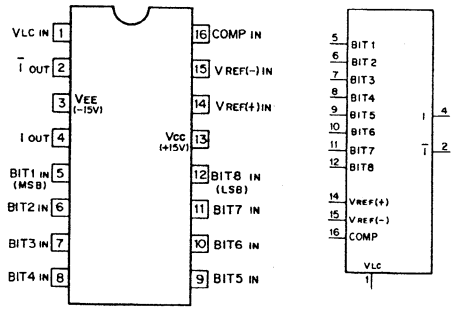
INPUTS			FUNCTION
$\overline{CE}$	$\overline{OE}$	$\overline{WE}$	
1	X	X	NO SELECTION(HI-Z)
0	1	1	OUTPUT DISABLE(HI-Z)
0	0	1	READ
0	X	0	WRITE

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE
HI-Z ; HIGH IMPEDANCE

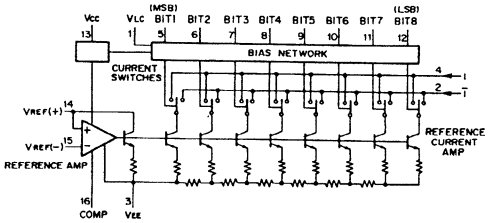


DAC08HQ (PMI)

8-BIT HIGH SPEED MULTIPLYING D/A CONVERTER
– TOP VIEW –

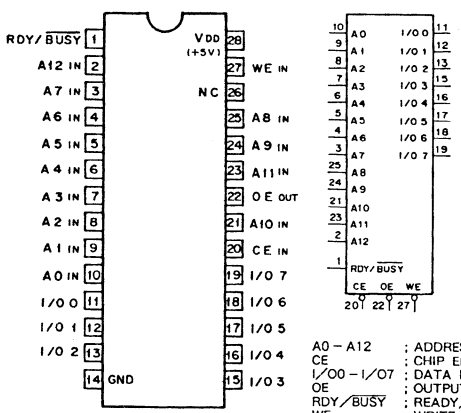


VLC : THRESHOLD CONTROL
MSB: MOST SIGNIFICANT BIT
LSB: LEAST SIGNIFICANT BIT
COMP: COMPENSATION

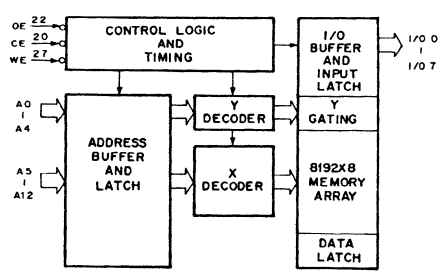


HN58C65P-25 (HITACHI)

C-MOS 64K (8192x8)-BIT EEPROM
– TOP VIEW –



A0 – A12 ; ADDRESS INPUTS
CE ; CHIP ENABLE INPUT
I/O0 – I/O7 ; DATA INPUTS/OUTPUTS
OE ; OUTPUT ENABLE
RDY/BUSY ; READY/BUSY OUTPUT
WE ; WRITE ENABLE INPUT

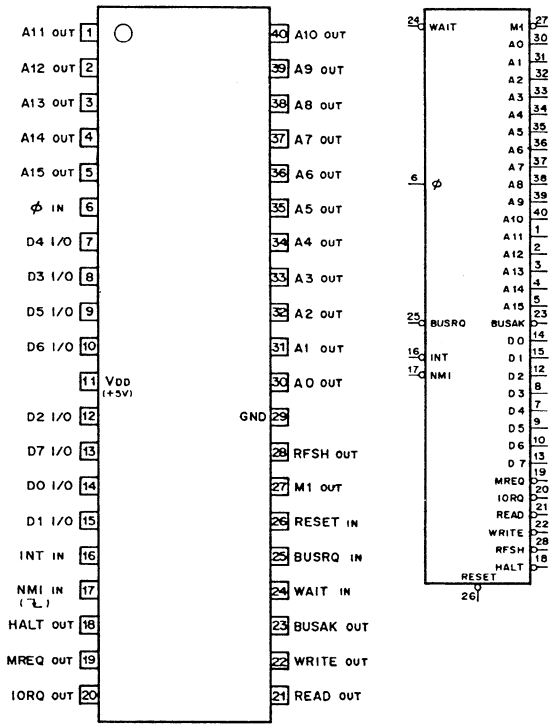


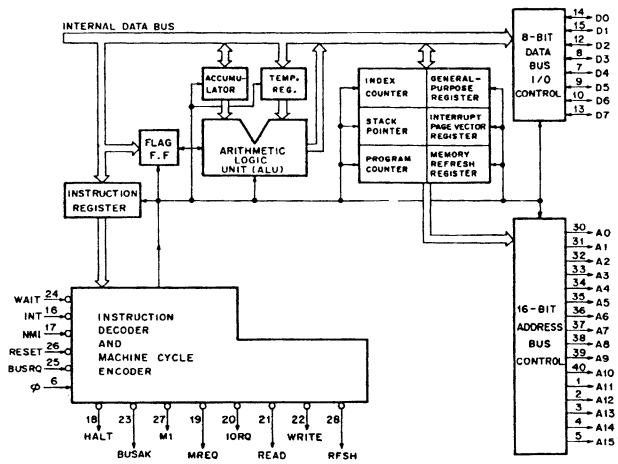
CE	OE	WE	RDY/BUSY	I/O TERMINAL	FUNCTION
0	0	1	HI-Z	DOUT	READ
1	X	X	HI-Z	HI-Z	STANDBY
0	1	0	HI-Z → LOW	DIN	WRITE
0	1	1	HI-Z	HI-Z	DESELECT
X	X	1	HI-Z	–	WRITE INH
X	0	X	HI-Z	–	WRITE INH
0	0	1	LOW	DATA OUT (I/O7)	DATA POLLING

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE
HI-Z ; HIGH IMPEDANCE

LH0080A (SHARP)

N-MOS 8-BIT MICROPROCESSOR
– TOP VIEW –





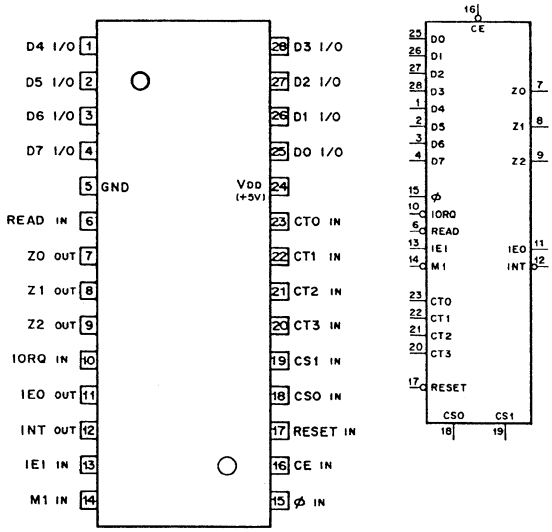
TEMP. REG. ; TEMPORARY REGISTER

φ ; CLOCK
A0-A15 ; 3-STATE ADDRESS OUTPUT
BUSAK ; BUS ACKNOWLEDGE
BUSRQ ; BUS REQUEST
D0-D7 ; 3-STATE DATA INPUT/OUTPUT
HALT ; HALT STATE
INT ; INTERRUPT REQUEST
IORQ ; 3-STATE I/O REQUEST
M1 ; MACHINE CYCLE 1
MREQ ; 3-STATE MEMORY REQUEST
NMI ; NON-MASKABLE INTERRUPT (DOWN EDGE TRIGGER)
READ ; 3-STATE MEMORY READ
RFSH ; REFRESH
WRITE ; 3-STATE MEMORY WRITE

LH0082AD (SHARP)

N-MOS COUNTER TIMER CIRCUIT

– TOP VIEW –

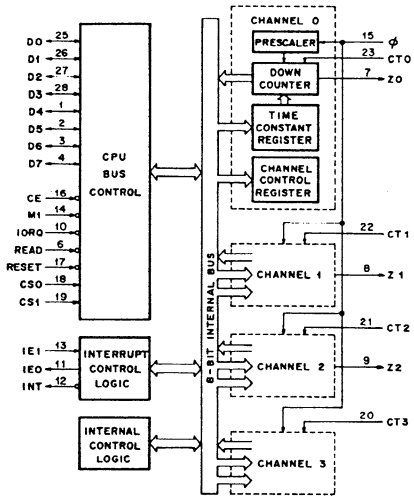


Ø ; SYSTEM CLOCK
CE ; CHIP ENABLE
CSO,CS1 ; CHANNEL SELECT
CT0-CT3 ; EXTERNAL CLOCK/TIMER TRIGGER
D0-D7 ; 3-STATE DATA INPUT/OUTPUT
IEI ; INTERRUPT ENABLE INPUT
IEO ; INTERRUPT ENABLE OUTPUT
INT ; INTERRUPT REQUEST (OPEN DRAIN)
IORQ ; I/O REQUEST
M1 ; MACHINE CYCLE 1
READ ; READ CYCLE STATUS
Z0-Z2 ; ZERO COUNT/TIME OUT

CHANNEL SELECT FUNCTION

CS1	CSO	SELECTED CHANNEL
0	0	0
0	1	1
1	0	2
1	1	3

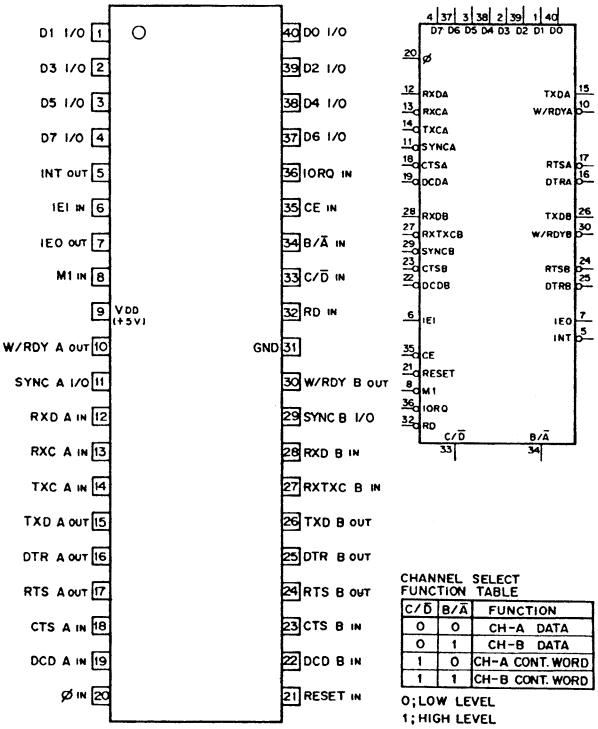
0;LOW LEVEL
1;HIGH LEVEL



LH0084A (SHARP)

N-MOS 2-CHANNEL SERIAL INPUT/OUTPUT FOR MICROCOMPUTER SYSTEM

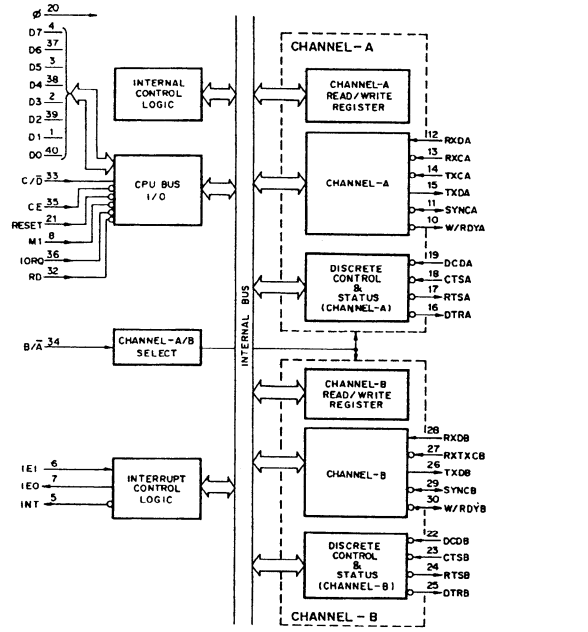
– TOP VIEW –



CHANNEL SELECT FUNCTION TABLE

C/D̄	B/Ā	FUNCTION
0	0	CH-A DATA
0	1	CH-B DATA
1	0	CH-A CONT. WORD
1	1	CH-B CONT. WORD

0;LOW LEVEL
1;HIGH LEVEL

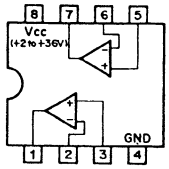


Ø ; SYSTEM CLOCK IN
D7-D0 ; DATA BUS(3 STATE)I/O
C/D̄ ; CONTROL/DATA SELECT IN
CE ; CHIP ENABLE IN
M1 ; MACHINE CYCLE 1 IN
IORQ ; I/O REQUEST IN
RD ; READ IN
B/Ā ; CHANNEL B/A SELECT IN
IEI ; INTERRUPT ENABLE IN
IEO ; INTERRUPT ENABLE OUT
INT ; INTERRUPT OUT

RXD ; RECEIVE DATA IN
RXC ; RECEIVE CLOCK IN
TXC ; TRANSMIT CLOCK IN
TXD ; TRANSMIT DATA OUT
SYNC ; EXTERNAL CHARACTER SYNCHRONIZATION I/O
W/RDY ; WAIT/READY OUT
DCD ; DATA CARRIER DETECT IN
CTS ; CLEAR TO SEND IN
RTS ; REQUEST TO SEND OUT
DTR ; DATA TERMINAL READY OUT

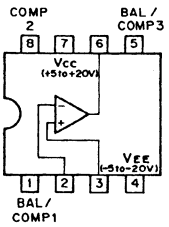
LM2903DQ (RAYTHEON)
NJM2903D (JRC)

DUAL VOLTAGE COMPARATORS
– TOP VIEW –



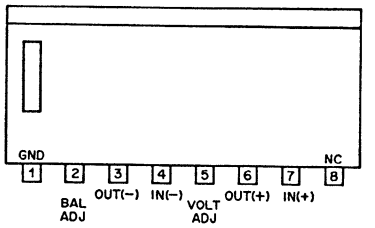
LM318P (TI)
uPC318C (NEC)

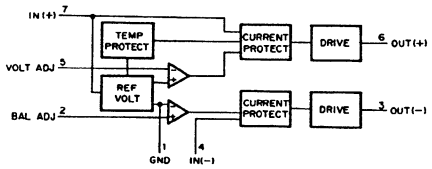
HIGH-PERFORMANCE OPERATIONAL AMPLIFIER
– TOP VIEW –



M5230L-A (MITSUBISHI)

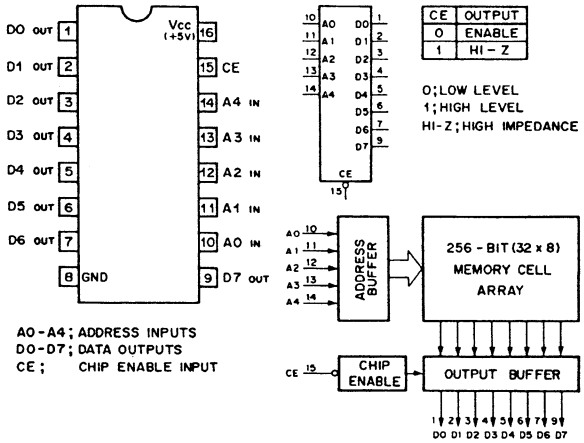
VOLTAGE REG.(TRACKING TYPE)
– PRINTED SIDE VIEW –





MB7112E (FUJITSU) (ACCESS TIME = 35nS)

256-BIT (32x8) PROM WITH 3-STATE OUTPUT
– TOP VIEW –

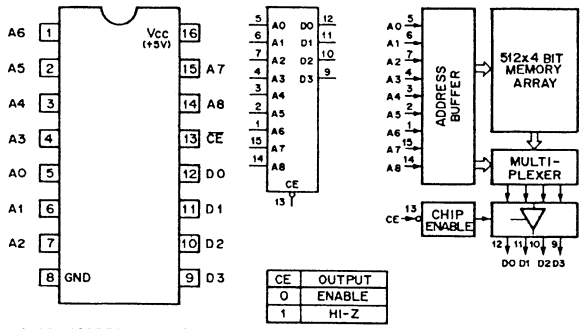


CE	OUTPUT
0	ENABLE
1	HI – Z

0; LOW LEVEL
1; HIGH LEVEL
HI-Z; HIGH IMPEDANCE

MB7116H (FUJITSU)

2K (512x4)-BIT PROM WITH 3-STATE OUTPUTS
– TOP VIEW –



AO-A8; ADDRESS INPUTS
DO-D3; DATA OUTPUTS
CE ; CHIP ENABLE INPUT

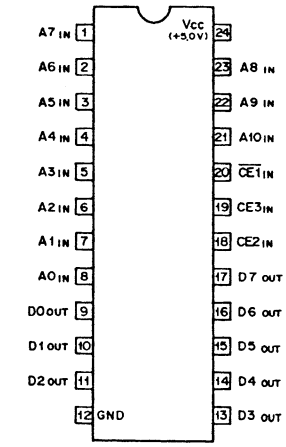
CE	OUTPUT
0	ENABLE
1	HI-Z

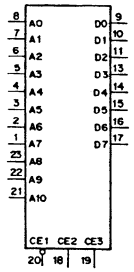
0 ; LOW LEVEL
1 ; HIGH LEVEL
HI-Z ; HIGH IMPEDANCE

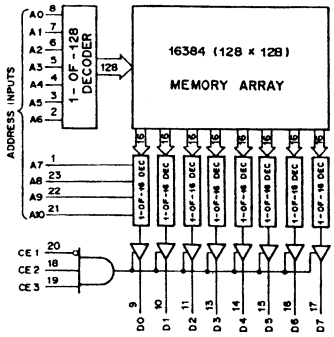
MB7138E (FUJITSU) (ACCESS TIME = 55nS)

16384-BIT (2048x8) PROM WITH 3-STATE OUTPUTS

– TOP VIEW –







CHIP SEL			OUTPUT
CE1	CE2	CE3	
0	1	1	ENABLE
1	0	X	HI-IMPEDANCE
1	X	0	

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE

WORD / ADDRESS TABLE

WORD	ADDRESS INPUT									
	A10	A9	A8	A7	A6	A5	A4	A3	A2	A1	A0
0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	1
2	0	0	0	0	0	0	0	0	0	1	0
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
2045	1	1	1	1	1	1	1	1	1	0	1
2046	1	1	1	1	1	1	1	1	1	1	0
2047	1	1	1	1	1	1	1	1	1	1	1

DATA CODE / ACTUAL DATA

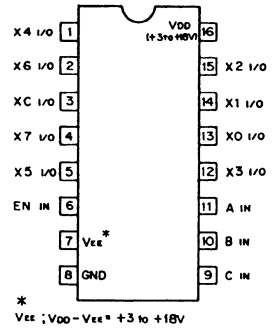
DATA CODE		ACTUAL DATA							
		D7	D6	D5	D4	D3	D2	D1	D0
0	00	0	0	0	0	0	0	0	0
1	01	0	0	0	0	0	0	0	1
2	02	0	0	0	0	0	0	1	0
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
8	08	0	0	0	0	1	0	0	0
9	09	0	0	0	0	1	0	0	1
10	0A	0	0	0	0	1	0	1	0
11	0B	0	0	0	0	1	0	1	1
12	0C	0	0	0	0	1	1	0	0
13	0D	0	0	0	0	1	1	0	1
14	0E	0	0	0	0	1	1	1	0
15	0F	0	0	0	0	1	1	1	1
16	10	0	0	0	1	0	0	0	0
17	11	0	0	0	1	0	0	0	1
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
238	EE	1	1	1	0	1	1	1	0
239	EF	1	1	1	0	1	1	1	1
240	F0	1	1	1	1	0	0	0	0
241	F1	1	1	1	1	0	0	0	1
242	F2	1	1	1	1	0	0	1	0
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
248	F8	1	1	1	1	1	0	0	0
249	F9	1	1	1	1	1	0	0	1
250	FA	1	1	1	1	1	0	1	0
251	FB	1	1	1	1	1	0	1	1
252	FC	1	1	1	1	1	1	0	0
253	FD	1	1	1	1	1	1	0	1
254	FE	1	1	1	1	1	1	1	0
255	FF	1	1	1	1	1	1	1	1

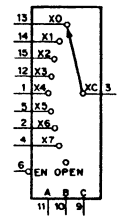
IN HEXADECIMAL
IN DECIMAL

MB84051B (FUJITSU)
TC4051BPHB (TOSHIBA)

C-MOS 8-CHANNEL ANALOG MULTIPLEXER/DEMULTIPLEXER

– TOP VIEW –





CONTROL INPUTS				SELECTED CHANNEL
EN	SELECT			
	C	B	A	
0	0	0	0	X0
0	0	0	1	X1
0	0	1	0	X2
0	0	1	1	X3
0	1	0	0	X4
0	1	0	1	X5
0	1	1	0	X6
0	1	1	1	X7
1	X	X	X	OPEN

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

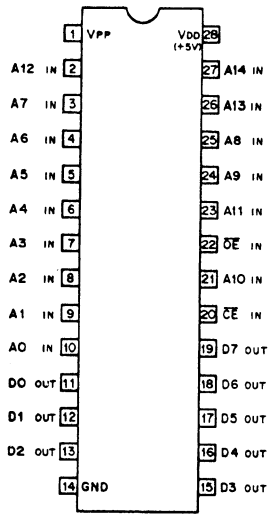
XO to X7; ANALOG INPUTS/OUTPUTS
XC; COMMON INPUT/OUTPUT
A,B,C; CHANNEL SELECT INPUT
EN; ENABLE INPUT

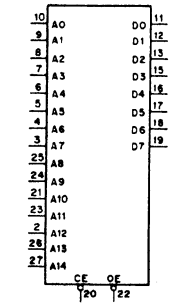
* VEE ; VDD - VEE = +3 to +18V

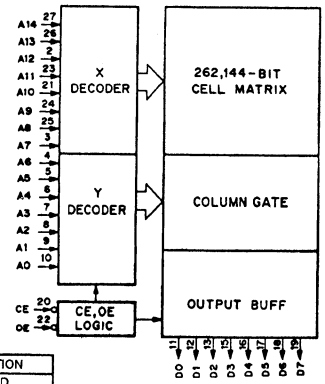
MBM27C256A-25 (FUJITSU) (ACCESS TIME = 250nS)

C-MOS 256K(32Kx8)-BIT UV ERASABLE PROM WITH 3-STATE OUTPUTS

– TOP VIEW –







A0 – A14 : ADDRESS INPUT
$\overline{CE}$: CHIP ENABLE INPUT
D0 – D7 : DATA OUTPUT
$\overline{OE}$: OUTPUT ENABLE INPUT
VPP : PROGRAM POWER SUPPLY

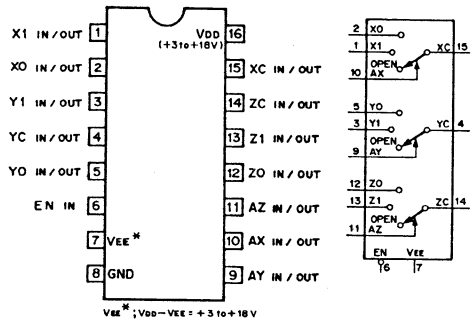
An	$\overline{CE}$	$\overline{OE}$	VPP	Dn	FUNCTION
An	0	0	+ 5V	DOUT	READ
An	0	1	+ 5V	HI-Z	OUTPUT DISABLE
X	1	X	+ 5V	HI-Z	STANDBY
An	0	1	+ 21V	DIN	PGM
An	0	0	+ 21V	DOUT	PGM VERIFY
X	1	1	+ 21V	HI-Z	PGM INH

0 : LOW LEVEL
1 : HIGH LEVEL
X : DON'T CARE
HI-Z : HIGH IMPEDANCE

MC14053BCP (MOTOROLA)

TC4053BP (TOSHIBA)

C-MOS TRIPLE 2-CHANNEL ANALOG MULTIPLEXER/DEMULTIPLEXER
– TOP VIEW –

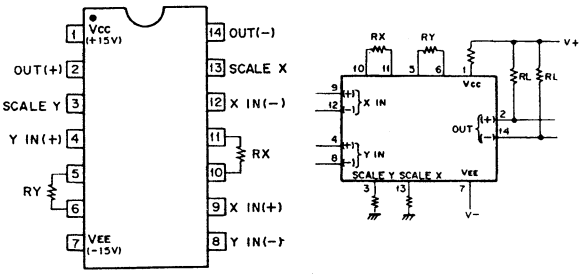


CONT. INPUTS		ON
EN	A (X,Y,Z)	CHANNEL
0	0	0
0	1	1
1	X	OPEN

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE.

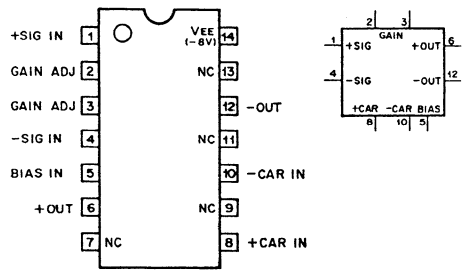
MC1495L (MOTOROLA)

FOUR-QUADRANT MULTIPLIER
– TOP VIEW –



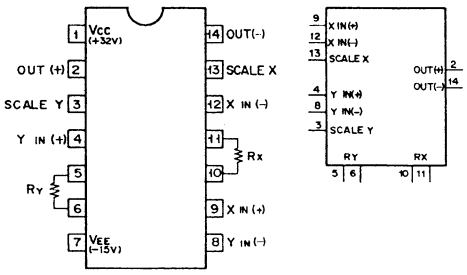
MC1496P (MOTOROLA)

BALANCED MODULATOR/DEMODULATOR
– TOP VIEW –



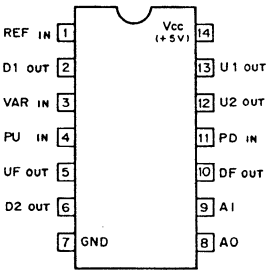
MC1595L (MOTOROLA)

LINEAR MULTIPLIER
– TOP VIEW –

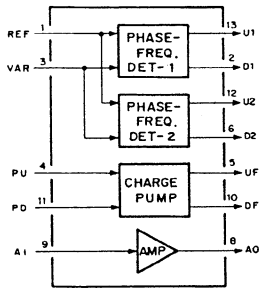


MC4044P (MOTOROLA)

PHASE-FREQUENCY DETECTOR
– TOP VIEW –



REF ; REFERENCE IN
VAR ; VARIABLE IN
U1 ; UP OUT 1
D1 ; DOWN OUT 1
U2 ; UP OUT 2
D2 ; DOWN OUT 2
PU ; CHARGE PUMP UP IN
PD ; CHARGE PUMP DOWN IN
UF ; CHARGE PUMP UP OUT
DF ; CHARGE PUMP DOWN OUT
AI ; FILTER AMP IN
AO ; FILTER AMP OUT



PHASE FREQ. DET-1
FALLING EDGE SENSING TYPE

INPUTS	OUTPUTS	
	U1	D1
$f_V = f_R$	1	1
$\phi_V = \phi_R$		
$f_V < f_R$	0	1
ϕ_V lags ϕ_R		
$f_V > f_R$	1	0
ϕ_V leads ϕ_R		

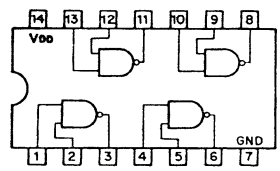
PHASE FREQ. DET-2
FOR 50% DUTY CYCLES

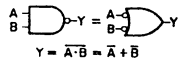
INPUTS		OUTPUTS	
REF	VAR	U2	D2
0	0	1	1
0	1	1	1
1	0	0	1
1	1	1	0

0 ; LOW LEVEL
1 ; HIGH LEVEL

MC74HC00AN (MOTOROLA)

C-MOS QUAD 2-INPUT NAND GATE
– TOP VIEW –





A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

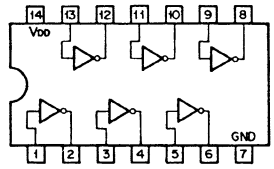
0 ; LOW LEVEL
1 ; HIGH LEVEL

NOTE :

TYPE	VDD
TC74AC00P TC74AC00F	+2 to +5.5V
MC74HCT00N 74ACT00PC	+5V
OTHER TYPES	+2 to +6V

MC74HC04AN (MOTOROLA)
SN74HC04N (TI)
TC74HC04AP (TOSHIBA)

C-MOS HEX INVERTER
– TOP VIEW –



A	Y
0	1
1	0

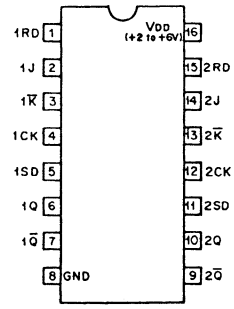
0:LOW LEVEL
1:HIGH LEVEL

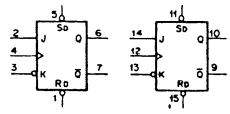
NOTE :

TYPE	VDD
74ACT04 TYPES 74HCT04 TYPES	+5V
TC74AC04F	+2 to +5.5V
TC74ACT04F	+4.5 to +5.5V
OTHER TYPES	+2 to +6V

MC74HC109N (MOTOROLA)

C-MOS J-K FLIP-FLOP WITH DIRECT SET/RESET
– TOP VIEW –



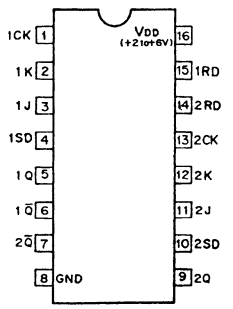


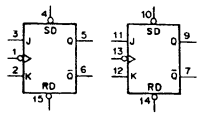
INPUTS					OUTPUTS	
SD	RD	CK	J	K̄	Qn+1	Q̄n+1
0	1	X	X	X	1	0
1	0	X	X	X	0	1
0	0	X	X	X	1*	1*
1	1	↓	0	1	Qn	Q̄n
			0	0	0	1
			1	1	1	0
			1	0	Q̄n	Qn
1	1	0	X	X	Qn	Q̄n

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE
*; NONSTABLE

MC74HC112N (MOTOROLA)

C-MOS J-K FLIP-FLOP WITH DIRECT SET/RESET
– TOP VIEW –



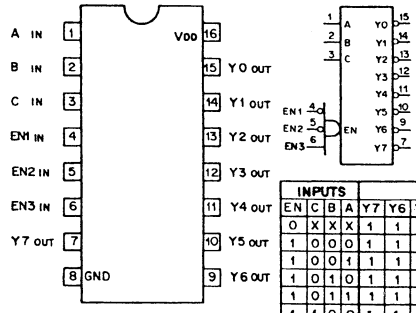


INPUT					OUTPUT	
SD	RD	CK	J	K	Qn+1	Q̄n+1
0	1	X	X	X	1	0
1	0	X	X	X	0	1
0	0	X	X	X	1*	1*
1	1	↓	0	0	Qn	Q̄n
			0	1	0	1
			1	0	1	0
			1	1	Q̄n	Qn
1	1	1	X	X	Qn	Q̄n

0; LOW LEVEL X; DON'T CARE
1; HIGH LEVEL *; NONSTABLE

MC74HC138AN (MOTOROLA)

C-MOS 3-TO-8 LINE DECODER/DEMULTIPLEXER
– TOP VIEW –



NOTE :

TYPE	VDD
74AC/74HC	+2 to +6V
74ACT/74HCT	+5V
TC74AC138F	+2 to +5.5V

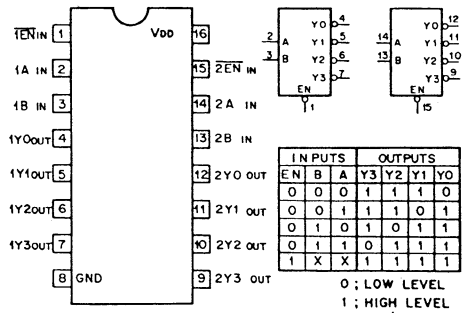
INPUTS				OUTPUTS							
EN	C	B	A	Y7	Y6	Y5	Y4	Y3	Y2	Y1	Y0
0	X	X	X	1	1	1	1	1	1	1	1
1	0	0	0	1	1	1	1	1	1	1	0
1	0	0	1	1	1	1	1	1	1	0	1
1	0	1	0	1	1	1	1	1	0	1	1
1	0	1	1	1	1	1	1	0	1	1	1
1	1	0	0	1	1	1	0	1	1	1	1
1	1	0	1	1	1	0	1	1	1	1	1
1	1	1	0	1	0	1	1	1	1	1	1
1	1	1	1	0	1	1	1	1	1	1	1

EN = $\overline{EN1} \cdot \overline{EN2} \cdot EN3$

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE

MC74HC139AN (MOTOROLA)

C-MOS DUAL 2-TO-4 DECODER/DEMULTIPLEXER
– TOP VIEW –



NOTE :

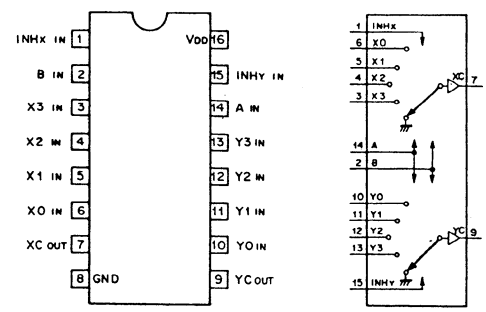
TYPE	VDD
74AC/74HC	+2 to +6V
74ACT	+5V
TC74AC139F	+2 to +5.5V

INPUTS			OUTPUTS			
EN	B	A	Y3	Y2	Y1	Y0
0	0	0	1	1	1	0
0	0	1	1	1	0	1
0	1	0	1	0	1	1
0	1	1	0	1	1	1
1	X	X	1	1	1	1

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE

MC74HC153N (MOTOROLA)
SN74HC153N (TI)

C-MOS DUAL 4-LINE-TO-1-LINE DATA SELECTOR/MULTIPLEXER
– TOP VIEW –



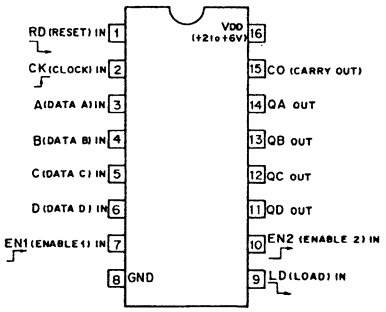
TYPE	VDD
EXCEPT FOL TYPE	+2 to +6V
74ACT153PC 74ACT153SJ	+5V
TC74AC153P	+2 to +5.5V

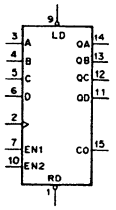
CONTROL IN			ON CHANNEL
INH	B	A	
0	0	0	0
0	0	1	1
0	1	0	2
0	1	1	3
1	X	X	GND

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE

MC74HC161N (MOTOROLA) (V_{DD} = + 2 to + 6V)
SN74HC161N (TI) (V_{DD} = + 2 to + 6V)

C-MOS SYNCHRONOUS PRESETTABLE 4-BIT BINARY COUNTER
– TOP VIEW –





MODE SELECTION

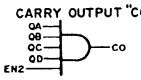
CONTROL INPUTS				MODE
RD	LD	EN1	EN2	
0	X	X	X	RESET (ASYNCHRONOUS)
1	0	X	X	PRESET (SYNCHRONOUS)
1	1	0	X	NO COUNT
1	1	X	0	NO COUNT
1	1	1	1	COUNT

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

COUNT SEQUENCE

COUNT	OUTPUTS			
	QD	QC	QB	QA
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1

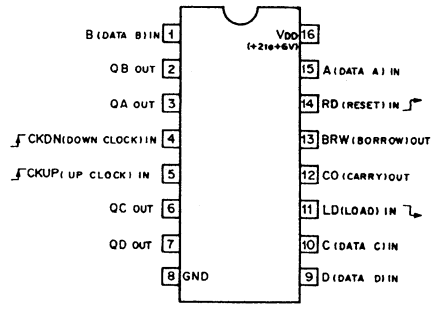
CARRY OUTPUT "CO"

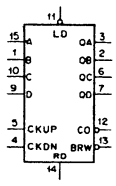


CO IS HIGH WHEN EN2 INPUT IS HIGH AND COUNT IS "15".

MC74HC193N (MOTOROLA)
SN74HC193N (TI)

C-MOS PRESETTABLE SYNCHRONOUS 4-BIT UP/DOWN COUNTER
– TOP VIEW –

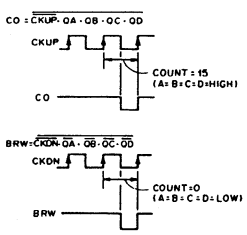




CONTROL INPUT				MODE
RD	LD	CKUP	CKDN	
1	X	X	X	RESET TO ZERO
0	0	X	X	PRESET
0	1	↑	1	UP COUNT
0	1	1	↑	DOWN COUNT
0	1	1	1	NO COUNT

COUNT	OUTPUT			
	QD	QC	QB	QA
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1

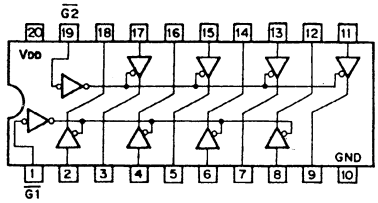
UP COUNT
DOWN COUNT

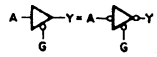


0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

MC74HC244AN (MOTOROLA)

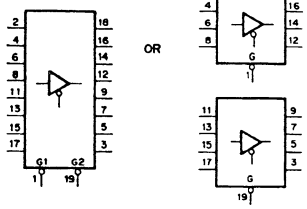
C-MOS BUS BUFFER WITH 3-STATE OUTPUTS
– TOP VIEW –





G	A	Y
0	0	0
0	1	1
1	X	HI-Z

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE
HI-Z; HIGH IMPEDANCE

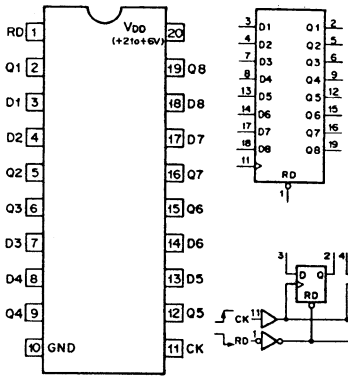


NOTE :

TYPE	VDD
AC HC 40H	+2 to +6V
ACT HCT	+5V

MC74HC273N (MOTOROLA)
SN74HC273N (TI)

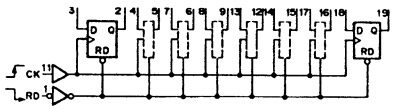
C-MOS D-TYPE FLIP-FLOP WITH RESET
– TOP VIEW –



EACH FLIP-FLOP

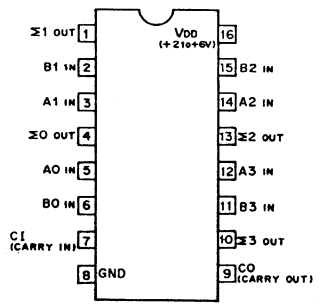
INPUT			OUT
RD	CK	D	Q
0	X	X	0
1	↑	0	0
1	↑	1	1
1	0	X	Q0

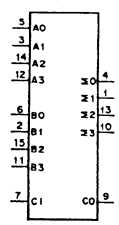
0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE



MC74HC283N (MOTOROLA)

C-MOS 4-BIT BINARY FULL ADDER
– TOP VIEW –





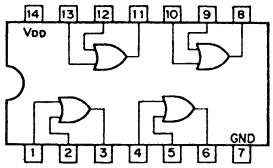
2^4	2^3	2^2	2^1	2^0	DIGIT
				CI	CARRY IN
	A3	A2	A1	A0	DATA A IN
+	B3	B2	B1	B0	DATA B IN
CO	Σ3	Σ2	Σ1	Σ0	CARRY & SUM OUT

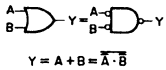
EX.

				1	CI
	1	0	1	1	A
+	1	0	1	0	B
1	0	1	1	0	OUTPUTS
CO	Σ3	Σ2	Σ1	Σ0	

MC74HC32AN (MOTOROLA)

C-MOS 2-INPUT OR GATE
– TOP VIEW –





$Y = A + B = \overline{A} \cdot \overline{B}$

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

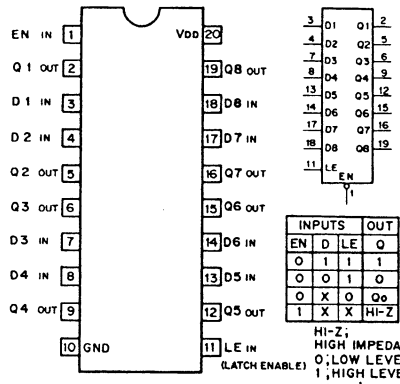
0;LOW LEVEL
1;HIGH LEVEL

NOTE :

TYPE	VDD
TC74AC32F	+2 to +5.5V
OTHER TYPES	+2 to +6V

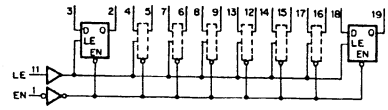
MC74HC373N (MOTOROLA) (V_{DD} = + 2 to + 6V)
SN74HC373N (TI) (V_{CC} = + 2 to + 6V)

C-MOS 3-STATE OUTPUTS OCTAL LATCHES
– TOP VIEW –



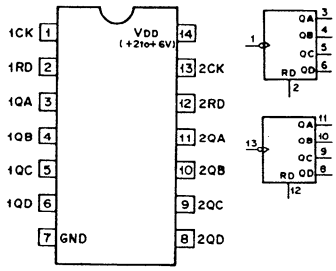
INPUTS			OUT
EN	D	LE	Q
0	1	1	1
0	0	1	0
0	X	0	Q_0
1	X	X	HI-Z

HI-Z;
HIGH IMPEDANCE
0;LOW LEVEL
1;HIGH LEVEL
X;DON'T CARE



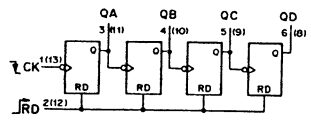
MC74HC393N (MOTOROLA)
SN74HC393N (TI)

C-MOS 4-BIT BINARY COUNTER
– TOP VIEW –



COUNT SEQUENCE

COUNT	QD	QC	QB	QA
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1



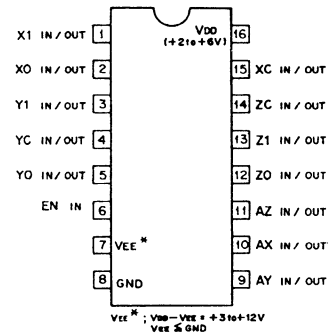
RESET/COUNT FUNCTION

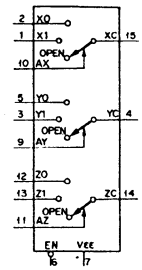
RD	QD	QC	QB	QA
1	0	0	0	0
0	COUNT			

0;LOW LEVEL
1;HIGH LEVEL

MC74HC4053N (MOTOROLA)

C-MOS TRIPLE 2-CHANNEL ANALOG MULTIPLEXER/DEMULTIPLEXER
– TOP VIEW –



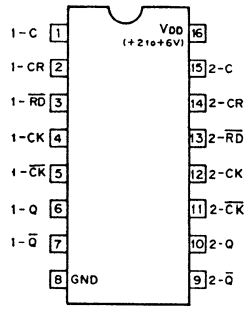


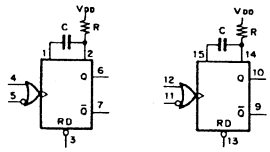
CONT. INPUTS		ON
EN	A (X_i,Y_i,Z_i)	CHANNEL
0	0	0
0	1	1
1	X	OPEN

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE.

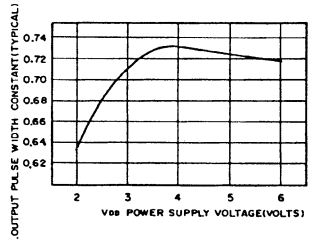
MC74HC4538N (MOTOROLA)

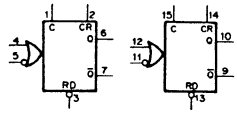
C-MOS DUAL RETRIGGERABLE / NON-RETRIGGERABLE MONOSTABLE MULTIVIBRATOR
– TOP VIEW –





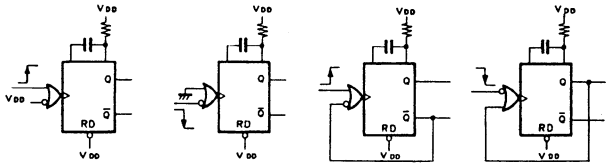
OUTPUT PULSE WIDTH = k·C·R





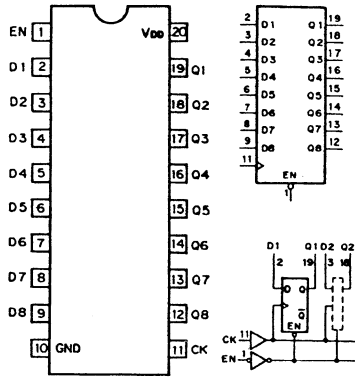
RETRIGGERABLE M.M.V

NON-RETRIGGERABLE M.M.V



MC74HC574N (MOTOROLA)

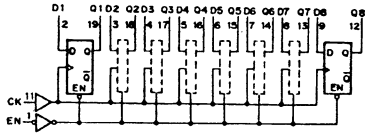
C-MOS 3-STATE D-TYPE EDGE-TRIGGERED FLIP-FLOP
– TOP VIEW –



EACH FLIP-FLOP

INPUTS			OUT
EN	CK	D	Q
0	↑	1	1
0	↑	0	0
0	0	X	Qo
1	X	X	HI-Z

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE
HI-Z ; HIGH IMPEDANCE
Qo ; NO CHANGE

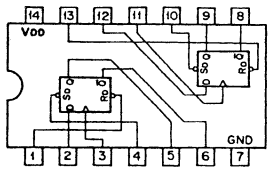


NOTE :

TYPE	VDD
74AC/74HC	+2 to +6V
74HCT	+5V
TC74AC574F	+2 to +5.5V

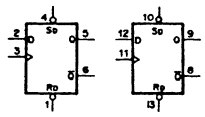
MC74HC74AN (MOTOROLA)
MC74HC74N (MOTOROLA)

C-MOS D-TYPE FLIP FLOP WITH DIRECT SET/RESET
– TOP VIEW –



INPUTS				OUTPUTS	
So	Ro	CK	D	Qn+1	Qn+1
0	1	X	X	1	0
1	0	X	X	0	1
0	0	X	X	1	1
1	1	↑	1	1	0
1	1	↑	0	0	1
1	1	0	X	Qn	$\overline{Qn}$

0;LOW LEVEL
1;HIGH LEVEL
X;DON'T CARE

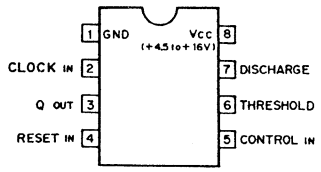


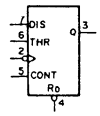
NOTE :

TYPE	VDD
74ACT	+5V
TC74AC74F	+2 to +5.5V
TC74ACT74F	+4.5 to +5.5V
OTHER TYPES	+2 to +6V

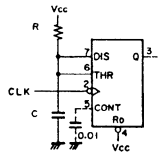
NJM555D (JRC)

PRECISION TIMER
– TOP VIEW –



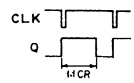


MONOSTABLE MULTIVIBRATOR

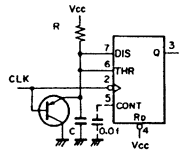


INPUTS		OUT
Ro	CLK	Q
0	X	0
1	↓	↑

0 , LOW LEVEL
1 , HIGH LEVEL
X , DON'T CARE

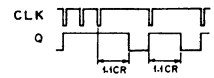


RETRIGGERABLE MONO. MULTIVIBRATOR
(MISSING PULSE DETECTOR)

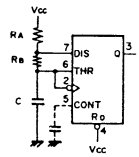


INPUTS		OUT
Ro	CLK	Q
0	X	0
1	↓	↑

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE



ASTABLE MULTIVIBRATOR

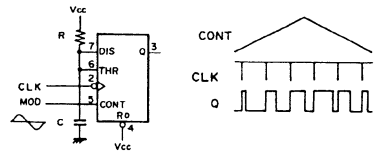


Ro	Q
0	0
1	↑

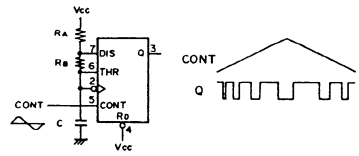
0;LOW LEVEL
1;HIGH LEVEL

$T_H = 0.693C\,(R_A + R_B)$
$T_L = 0.693C\,R_B$

PULSE WIDTH MODULATOR



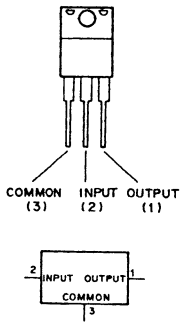
VCO
(PULSE POSITION MODULATOR)



NJM7908FA (JRC) – 8V

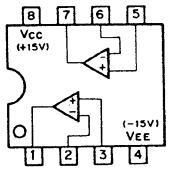
RC79M05FA (RAYTHEON) – 5V

NEGATIVE VOLTAGE REGULATOR
– FRONT VIEW –



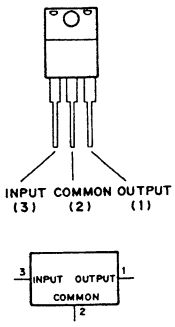
RC4558 (RAYTHEON)
RC4558DQ (RAYTHEON)
RC4558P (TI)
uPC4558C (NEC)
uPC4558G2 (NEC) FLAT PACKAGE

OPERATIONAL AMPLIFIER
– TOP VIEW –



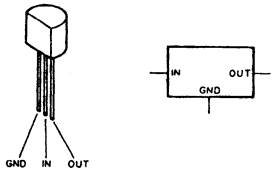
RC7808FA (RAYTHEON) + 8V
RC7812FA (RAYTHEON) + 12V

POSITIVE VOLTAGE REGULATOR
– FRONT VIEW –



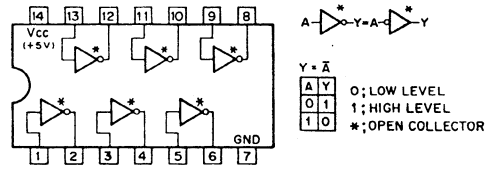
RC79L08A (RAYTHEON) – 8V
RC79L09A (RAYTHEON) – 9V

NEGATIVE VOLTAGE REGULATOR (100mA)



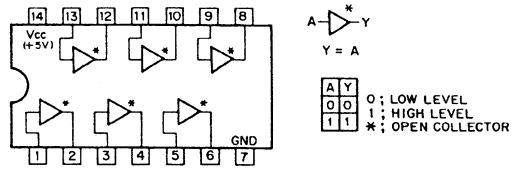
SN7406N (TI)

TTL INVERTER BUFFER/DRIVER WITH OPEN-COLLECTOR
– TOP VIEW –



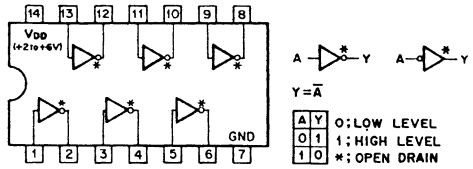
SN7407N (TI)

TTL BUFFER/DRIVER WITH OPEN-COLLECTOR
– TOP VIEW –



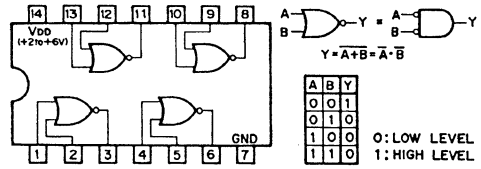
SN74HC05N (TI)

C-MOS HEX INVERTER WITH OPEN-DRAIN
– TOP VIEW –



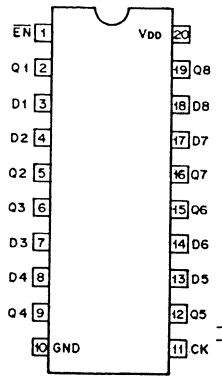
SN74HC36N (TI)

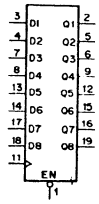
C-MOS 2-INPUT NOR GATE
– TOP VIEW –



SN74HC374N (TI)

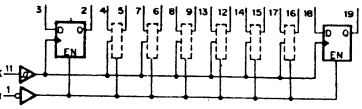
C-MOS 3-STATE OCTAL D-TYPE FLIP-FLOP
– TOP VIEW –





INPUTS			OUT
EN	D	CK	Q
0	1	↑	1
0	0	↑	0
0	X	0	Q0
1	X	X	HI-Z

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE
HI-Z ; HIGH IMPEDANCE

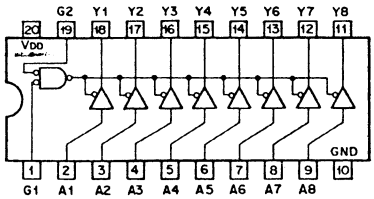


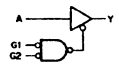
NOTE :

TYPE	VDD
74AC/74HC	+2 to +6V
74ACT/74HCT	+5V

SN74HC541N (TI)

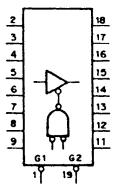
C-MOS BUFFERS AND LINE DRIVERS WITH 3-STATE OUTPUTS
– TOP VIEW –





G1	G2	A	Y
0	0	0	0
0	0	1	1
1	X	X	HI-Z
X	1	X	HI-Z

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE
HI-Z ; HIGH IMPEDANCE

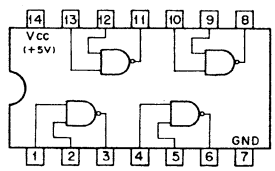


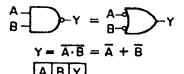
NOTE :

TYPE	VDD
74AC	+2 to +6V
74ACT/74HCT	+5V
TC74AC541F	+2 to +5.5V

SN74LS00N (TI)
SN74S00N (TI)

TTL 2-INPUT POSITIVE-NAND GATE
– TOP VIEW –



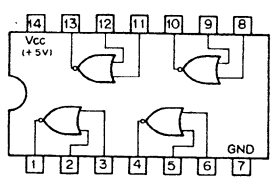


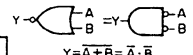
A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

0 ; LOW LEVEL
1 ; HIGH LEVEL

SN74LS02N (TI)

TTL 2-INPUT POSITIVE-NOR GATE
– TOP VIEW –



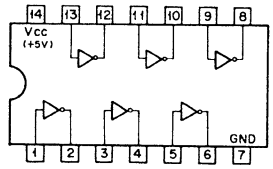


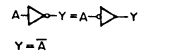
A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

0 ; LOW LEVEL
1 ; HIGH LEVEL

SN74LS04N (TI)
SN74S04N (TI)

TTL INVERTER
– TOP VIEW –



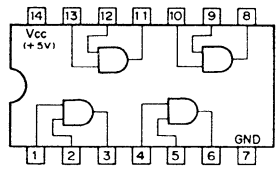


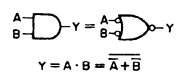
A	Y
0	1
1	0

0 ; LOW LEVEL
1 ; HIGH LEVEL

SN74LS08N (TI)

TTL 2-INPUT POSITIVE-AND GATE
– TOP VIEW –



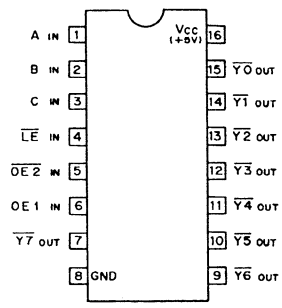


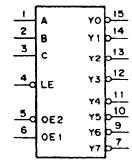
A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

0 ; LOW LEVEL
1 ; HIGH LEVEL

SN74LS137N (TI)

TTL 3-TO-8-LINE DECODER/DEMULTIPLEXER WITH ADDRESS LATCHES
– TOP VIEW –





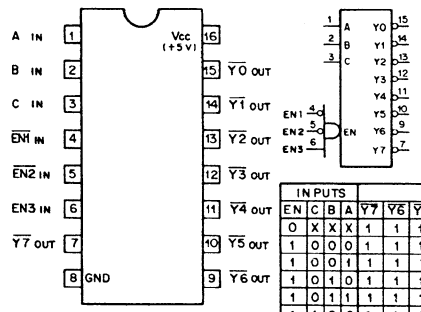
A0 – A3 : ADDRESS INPUTS
Y0 – Y7 : DATA OUTPUTS
LE : LATCH ENABLE INPUT
OE1 : OUTPUT ENABLE 1 INPUT
OE2 : OUTPUT ENABLE 2 INPUT

INPUTS						OUTPUTS							
LE	EN1	EN2	C	B	A	Y7	Y6	Y5	Y4	Y3	Y2	Y1	Y0
×	×	1	×	×	×	1	1	1	1	1	1	1	1
×	0	×	×	×	×	1	1	1	1	1	1	1	1
0	1	0	0	0	0	1	1	1	1	1	1	1	0
0	1	0	0	0	1	1	1	1	1	1	1	0	1
0	1	0	0	1	0	1	1	1	1	1	0	1	1
0	1	0	0	1	1	1	1	1	1	0	1	1	1
0	1	0	1	0	0	1	1	1	0	1	1	1	1
0	1	0	1	0	1	1	1	0	1	1	1	1	1
0	1	0	1	1	0	1	0	1	1	1	1	1	1
0	1	0	1	1	1	0	1	1	1	1	1	1	1
1	1	0	×	×	×	NOT CHANGE							

0 ; LOW LEVEL
1 ; HIGH LEVEL
× ; DON'T CARE

SN74LS138N (TI)

TTL 3-TO-8-LINE DECODER/DEMULTIPLEXER
– TOP VIEW –



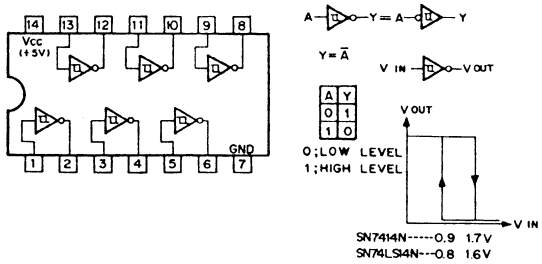
INPUTS				OUTPUTS							
EN	C	B	A	Y7	Y6	Y5	Y4	Y3	Y2	Y1	Y0
0	X	X	X	1	1	1	1	1	1	1	1
1	0	0	0	1	1	1	1	1	1	1	0
1	0	0	1	1	1	1	1	1	1	0	1
1	0	1	0	1	1	1	1	1	0	1	1
1	0	1	1	1	1	1	1	0	1	1	1
1	1	0	0	1	1	1	0	1	1	1	1
1	1	0	1	1	1	0	1	1	1	1	1
1	1	1	0	1	0	1	1	1	1	1	1
1	1	1	1	0	1	1	1	1	1	1	1

EN = EN1·EN2·EN3

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE

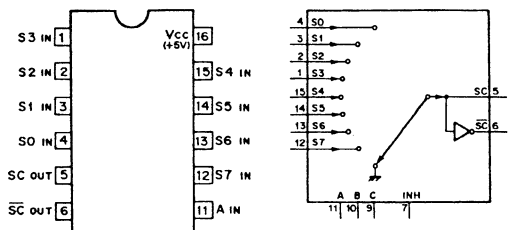
SN74LS14N (TI)

TTL SCHMITT TRIGGER INVERTER
– TOP VIEW –



SN74LS151N (TI)

TTL 8-LINE-TO-1-LINE DATA SELECTOR/MULTIPLEXER
– TOP VIEW –

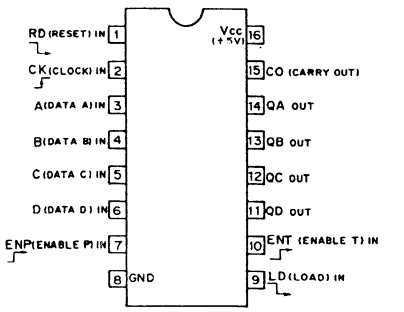


CONTROL INPUTS				ON CHANNEL
INH	C	B	A	
0	0	0	0	0
0	0	0	1	1
0	0	1	0	2
0	0	1	1	3
0	1	0	0	4
0	1	0	1	5
0	1	1	0	6
0	1	1	1	7
1	X	X	X	GND

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE

SN74LS161AN (TI)

TTL PRESETTABLE SYNCHRONOUS 4-BIT BINARY COUNTER
– TOP VIEW –



MODE SELECTION

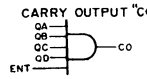
CONTROL INPUTS				MODE
Rd	LD	ENP	ENT	
0	X	X	X	RESET (ASYNCHRONOUS)
1	0	X	X	PRESET (SYNCHRONOUS)
1	1	0	X	NO COUNT
1	1	X	0	NO COUNT
1	1	1	1	COUNT

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE

COUNT SEQUENCE

COUNT	OUTPUTS			
	QD	QC	QB	QA
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1

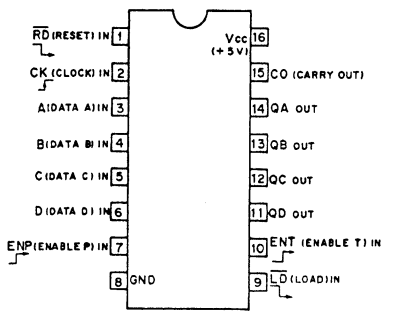
CARRY OUTPUT "CO"



CO IS HIGH WHEN ENT INPUT IS HIGH AND COUNT IS "15".

SN74LS163AN (TI)

TTL PRESETTABLE SYNCHRONOUS 4-BIT BINARY COUNTER
– TOP VIEW –



MODE SELECTION

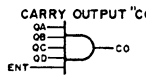
CONTROL INPUTS				MODE
Rd	LD	ENP	ENT	
0	X	X	X	RESET (SYNCHRONOUS)
1	0	X	X	PRESET (SYNCHRONOUS)
1	1	0	X	NO COUNT
1	1	X	0	NO COUNT
1	1	1	1	COUNT

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE

COUNT SEQUENCE

COUNT	OUTPUTS			
	QD	QC	QB	QA
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1

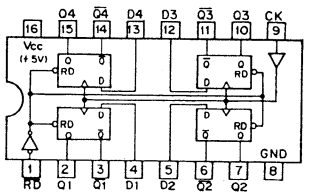
CARRY OUTPUT "CO"

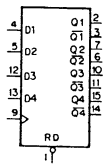


CO IS HIGH WHEN ENT INPUT IS HIGH AND COUNT IS "15".

SN74LS175N (TI)

TTL D-TYPE FLIP-FLOP WITH CLEAR
– TOP VIEW –



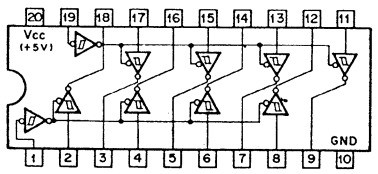


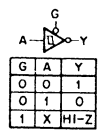
R̄D	CK	D	Q	Q̄
0	X	X	0	1
1	↓	1	1	0
1	↓	0	0	1
1	0	X	Q_0	$\bar{Q}_0$

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

SN74LS240N (TI)

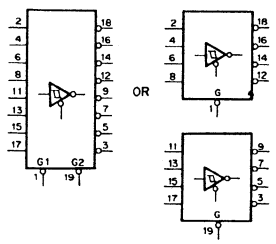
TTL 3-STATE SCHMITT TRIGGER INVERTER/LINE DRIVER
– TOP VIEW –





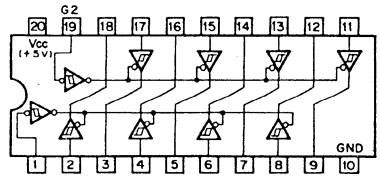
G	A	Y
0	0	1
0	1	0
1	X	HI-Z

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE
HI-Z; HIGH IMPEDANCE



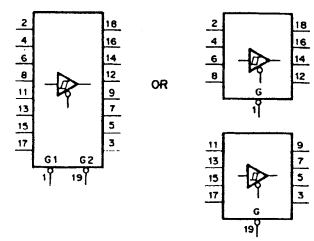
SN74LS244N (TI)

TTL 3-STATE SCHMITT TRIGGER BUFFER/DRIVER
– TOP VIEW –



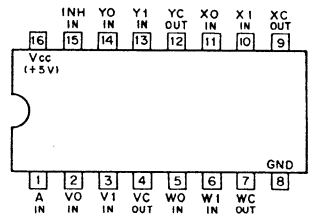
G	A	Y
0	0	0
0	1	1
1	X	HI-Z

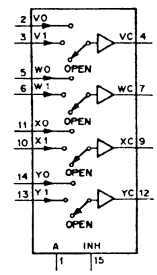
0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE
HI-Z; HIGH IMPEDANCE



SN74LS257AN (TI)

TTL 2-LINE-TO-1-LINE DATA SELECTOR/MULTIPLEXER
– TOP VIEW –



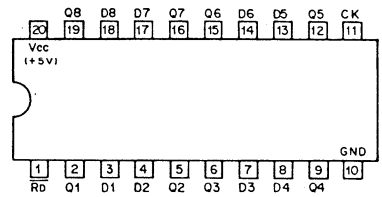


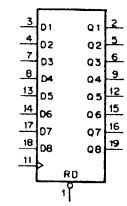
CONT. IN		ON CHANNEL
INH	A	
0	0	0
0	1	1
1	X	OPEN

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

SN74LS273N (TI)

TTL D-TYPE FLIP-FLOP WITH DIRECT RESET
– TOP VIEW –

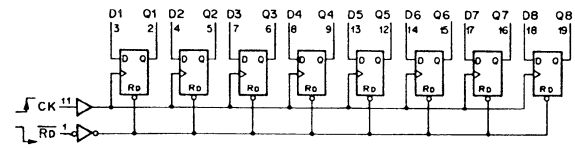




EACH FLIP – FLOP

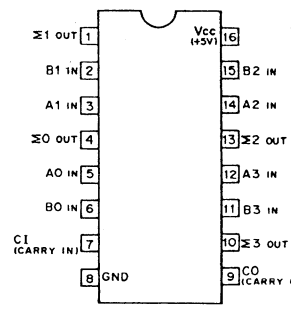
INPUTS			OUT
R̄D	CK	D	Q
0	X	X	0
1	↓	0	0
1	↓	1	1
1	0	X	Q_0

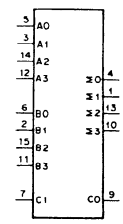
0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE



SN74LS283N (TI)

TTL 4-BIT BINARY FULL ADDER
– TOP VIEW –



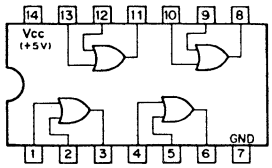


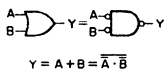
2^4 2^3 2^2 2^1 2^0 DIGIT
CI CARRY IN
A3 A2 A1 A0 DATA A IN
+) B3 B2 B1 B0 DATA B IN
CO Σ3 Σ2 Σ1 Σ0 CARRY&SUM OUT

EX. 1 CI
1 0 1 1 A
+) 1 0 1 0 B
1 0 1 1 0 OUTPUTS
CO Σ3 Σ2 Σ1 Σ0

SN74LS32N (TI)

TTL 2-INPUT POSITIVE-OR GATE
– TOP VIEW –



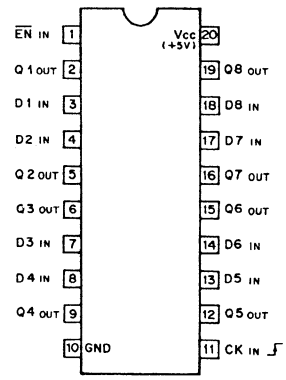


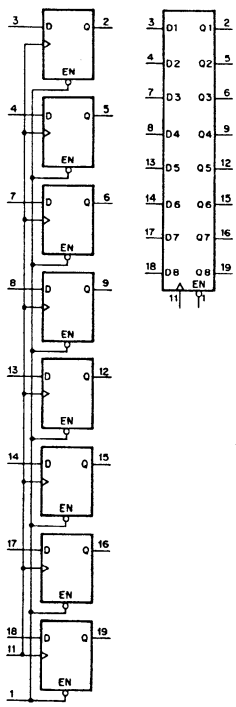
A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

0; LOW LEVEL
1; HIGH LEVEL

SN74LS377N (TI)

TTL D-TYPE FLIP-FLOP WITH ENABLE
– TOP VIEW –





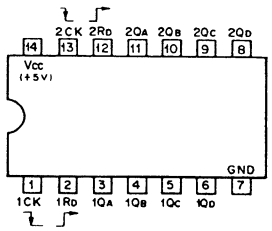
EACH FLIP-FLOP

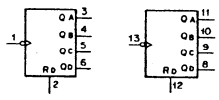
INPUTS			OUT
EN	CK	D	Q
1	X	X	Q_0
0	↓	1	1
0	↓	0	0
X	0	X	Q_0

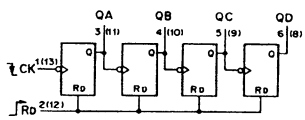
0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

SN74LS393N (TI)

TTL 4-BIT BINARY COUNTER
– TOP VIEW –







RESET/COUNT FUNCTION

RD	QD	QC	QB	QA
1	0	0	0	0
0	COUNT			

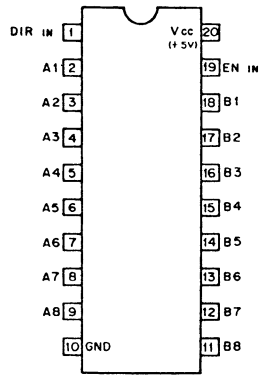
0; LOW LEVEL
1; HIGH LEVEL

COUNT SEQUENCE

COUNT	QD	QC	QB	QA
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1

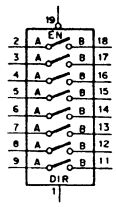
SN74LS645N (TI)

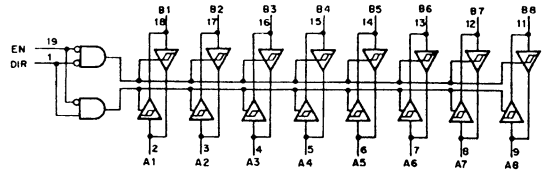
TTL BILATERAL SCHMITT TRIGGER BUS TRANSCEIVERS WITH 3-STATE OUTPUT
– TOP VIEW –



EN	DIR	OPERATION
0	0	B to A
0	1	A to B
1	X	HI-Z

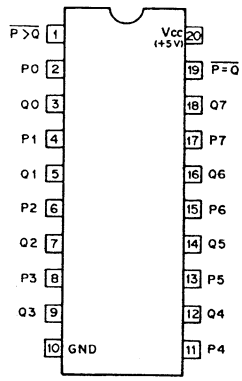
0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE.
HI-Z; HIGH IMPEDANCE

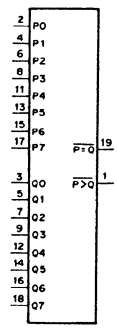




SN74LS682N (TI)

TTL 8-BIT MAGNITUDE COMPARATOR
WITH TOTEM-POLE OUTPUTS
– TOP VIEW –

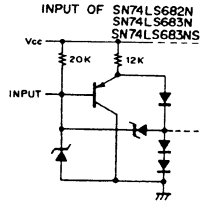




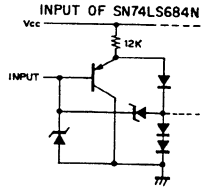
DATA INPUTS		OUTPUTS	
P0-P7	Q0-Q7	$\overline{P=Q}$	$\overline{P>Q}$
P=Q		0	1
P>Q		1	0
P<Q		1	1

1; HIGH LEVEL
0; LOW LEVEL

INPUT OF SN74LS682N
SN74LS683N
SN74LS683NS

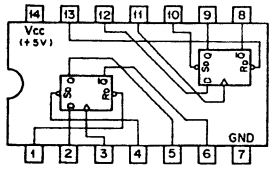


INPUT OF SN74LS684N



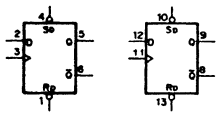
SN74LS74AN (TI)

TTL D-TYPE FLIP FLOP WITH DIRECT SET/RESET
– TOP VIEW –



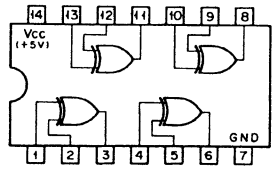
INPUTS				OUTPUTS	
$\overline{S_D}$	$\overline{R_D}$	CK	D	Qn+1	$\overline{Q_{n+1}}$
0	1	X	X	1	0
1	0	X	X	0	1
0	0	X	X	1*	1*
1	1	↓	1	1	0
1	1	↓	0	0	1
1	1	0	X	Qn	$\overline{Q_n}$

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE
↓; NONSTABLE



SN74LS86AN (TI)

TTL EXCLUSIVE OR GATE
– TOP VIEW –



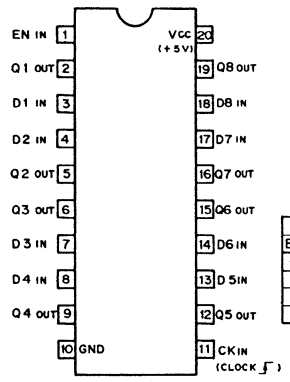
$Y = \overline{A} \cdot B + A \cdot \overline{B}$

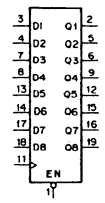
A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

0; LOW LEVEL
1; HIGH LEVEL

SN74S374N (TI)

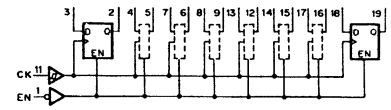
TTL 3-STATE OUTPUTS OCTAL D-TYPE FLIP-FLOP
– TOP VIEW –





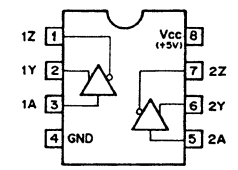
INPUTS			OUT
EN	D	CK	Q
0	1	↓	1
0	0	↓	0
0	X	0	Qo
1	X	X	HI-Z

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE
HI-Z; HIGH IMPEDANCE



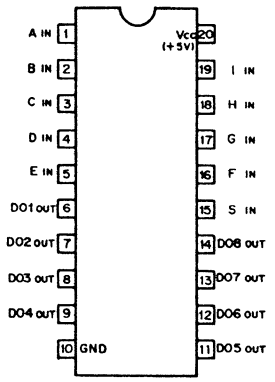
SN75158P (TI)

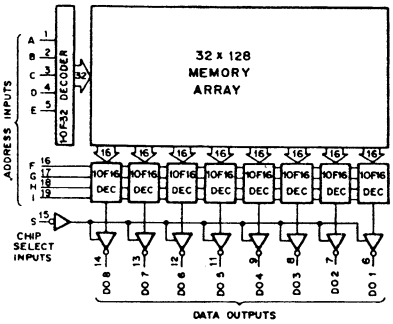
DUAL DIFFERENTIAL LINE DRIVE
– TOP VIEW –



TBP28L42N (TI)
TBP28S42N (TI)

4096-BIT (512x8) PROM (3-STATE OUTPUT)
– TOP VIEW –





OUTPUT MODE

CHIP SEL S	OUTPUT
0	ENABLE
1	HI-Z

0; LOW LEVEL
1; HIGH LEVEL
HI-Z; HIGH IMPEDANCE

WORD/ADDRESS TABLE

WORD	ADDRESS INPUT								
	I	H	G	F	E	D	C	B	A
0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	1
2	0	0	0	0	0	0	0	1	0
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
509	1	1	1	1	1	1	1	0	1
510	1	1	1	1	1	1	1	1	0
511	1	1	1	1	1	1	1	1	1

0; LOW LEVEL
1; HIGH LEVEL

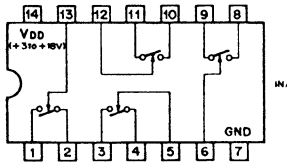
DATA CODE/ACTUAL DATA

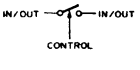
DATA CODE		ACTUAL DATA							
		DO8	DO7	DO6	DO5	DO4	DO3	DO2	DO1
0	00	0	0	0	0	0	0	0	0
1	01	0	0	0	0	0	0	0	1
2	02	0	0	0	0	0	0	1	0
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
8	08	0	0	0	0	1	0	0	0
9	09	0	0	0	0	1	0	0	1
10	0A	0	0	0	0	1	0	1	0
11	0B	0	0	0	0	1	0	1	1
12	0C	0	0	0	0	1	1	0	0
13	0D	0	0	0	0	1	1	0	1
14	0E	0	0	0	0	1	1	1	0
15	0F	0	0	0	0	1	1	1	1
16	10	0	0	0	1	0	0	0	0
17	11	0	0	0	1	0	0	0	1
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
238	EE	1	1	1	0	1	1	1	0
239	EF	1	1	1	0	1	1	1	1
240	F0	1	1	1	1	0	0	0	0
241	F1	1	1	1	1	0	0	0	1
242	F2	1	1	1	1	0	0	1	0
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
248	F8	1	1	1	1	1	0	0	0
249	F9	1	1	1	1	1	0	0	1
250	FA	1	1	1	1	1	0	1	0
251	FB	1	1	1	1	1	0	1	1
252	FC	1	1	1	1	1	1	0	0
253	FD	1	1	1	1	1	1	0	1
254	FE	1	1	1	1	1	1	1	0
255	FF	1	1	1	1	1	1	1	1

IN HEXADECIMAL
IN DECIMAL

TC4066BP (TOSHIBA)
TC4066BPHB (TOSHIBA)

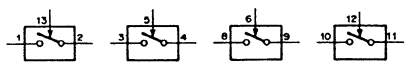
C-MOS BILATERAL ANALOG SWITCH
– TOP VIEW –





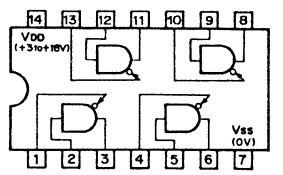
CONTROL	SWITCH
0	OFF
1	ON

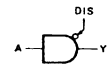
0; LOW LEVEL
1; HIGH LEVEL



TC5024BP (TOSHIBA)

C-MOS BUS BUFFER WITH 3-STATE OUTPUT
– TOP VIEW –



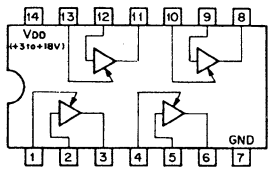


A	DIS	Y
0	0	0
1	0	1
0	1	HI-Z
1	1	HI-Z

0 ; LOW LEVEL
1 ; HIGH LEVEL
HI-Z ; HIGH IMPEDANCE

TC5025BP (TOSHIBA)

C-MOS 3-STATE BUFFER
– TOP VIEW –

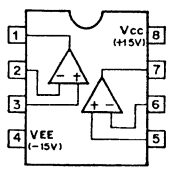


INPUTS		OUTPUTS
A	DIS	Y
0	0	Z
1	0	Z
0	1	0
1	1	1

0= LOW LEVEL
1 = HIGH LEVEL
Z= HIGH IMPEDANCE

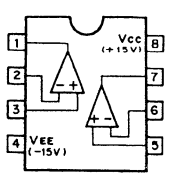
TL072ACP (TI)
TL072CP (TI)

OPERATIONAL AMPLIFIER
(LOW-NOISE, JFET-INPUT)
– TOP VIEW –



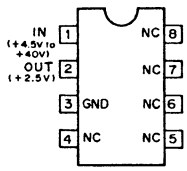
TL082CP (TI)
uPC4082C (NEC)

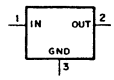
OPERATIONAL AMPLIFIER
(J FET-INPUT)
– TOP VIEW –



uPC1060C (NEC)

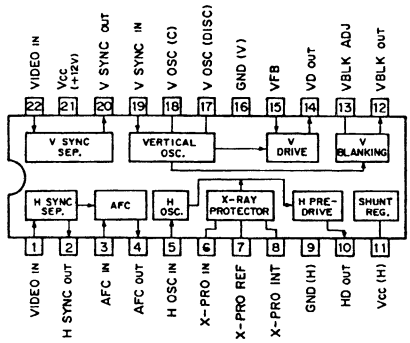
VOLTAGE REFERENCE
– TOP VIEW –





uPC1377C (NEC)

SYNCHRONIZATION SIGNAL PROCESSOR OF COLOR TV
– TOP VIEW –




```
AFC IN      ; INPUT OF AFC DETECTOR
AFC OUT     ; OUTPUT OF AFC DETECTOR
GND(H)      ; GROUND OF HORIZONTAL PART
GND(V)      ; GROUND OF VERTICAL PART
HD OUT      ; OUTPUT OF HORIZONTAL PULSE
HOSC IN     ; INPUT OF HORIZONTAL OSCILLATION
HSYNC OUT   ; OUTPUT OF SYNCRONIZATION SIGNAL SEPARATOR
VBLK OUT    ; OUTPUT OF VERTICAL BLANKING PULSE
VBLKADJ     ; VERTICAL BLANKING PULSE DURATION ADJUST
VCC         ; VCC OF VERTICAL PART
VCC(H)      ; VCC OF HORIZONTAL PART
VD OUT      ; OUTPUT OF VERTICAL AMPLIFIER
VFB         ; VERTICAL FEEDBACK
VIDEO IN    ; INPUT OF HORIZONTAL/VERTICAL SYNCRONIZATION
              SIGNAL SEPARATOR
VOSC(C)     ; VERTICAL OSCILLATION (CHARGE)
VOSC(DISC)  ; VERTICAL OSCILLATION (DISCHARGE)
VSYNC IN    ; INPUT OF VERTICAL SYNCRONIZATION SIGNAL
VSYNC OUT   ; OUTPUT OF VERTICAL SYNCRONIZATION SIGNAL
              SEPARATOR
X-PRO IN    ; INPUT OF X-RAY PROTECTOR
X-PRO INT   ; INTEGRATION CIRCUIT OF X-RAY PROTECTOR
X-PRO REF   ; REFERENCE OF X-RAY PROTECTOR
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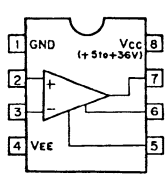
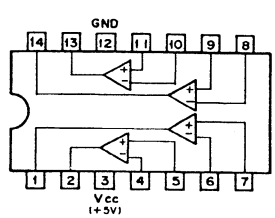
uPC311C (NEC)

VOLTAGE COMPARATOR
– TOP VIEW –



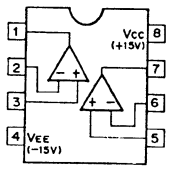
uPC339C (NEC)

COMPARATOR
– TOP VIEW –



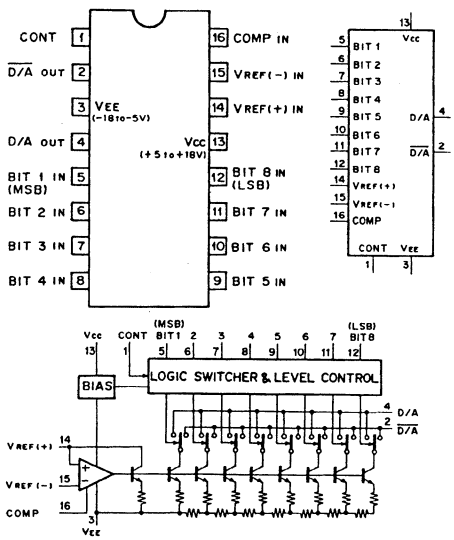
uPC4557C (NEC)

OPERATIONAL AMPLIFIER (WIDE BAND, LOW NOISE)
– TOP VIEW –



uPC624C (NEC)

8-BIT D/A CONVERTER WITH OPEN COLLECTOR OUTPUT
– TOP VIEW –



UPC7805H (NEC) + 5V
UPC7808H (NEC) + 8V
UPC7812H (NEC) + 12V

POSITIVE VOLTAGE REGULATOR (1A)
– SIDE VIEW –

AN7805 (MATSUSHITA) + 5V
AN7806 (MATSUSHITA) + 6V
AN7807 (MATSUSHITA) + 7V
AN7808 (MATSUSHITA) + 8V
AN7809 (MATSUSHITA) + 9V
AN7810 (MATSUSHITA) + 10V
AN7812 (MATSUSHITA) + 12V
AN7815 (MATSUSHITA) + 15V
AN7818 (MATSUSHITA) + 18V
AN7820 (MATSUSHITA) + 20V
AN7824 (MATSUSHITA) + 24V
FS7805 (SANKEN) + 5V
FS7812 (SANKEN) + 12V
FS7815 (SANKEN) + 15V
FS7824 (SANKEN) + 24V
HA17805P (HITACHI) + 5V
HA17806P (HITACHI) + 6V
HA17807P (HITACHI) + 7V
HA17808P (HITACHI) + 8V
HA17812P (HITACHI) + 12V
HA17815P (HITACHI) + 15V
HA17818P (HITACHI) + 18V
HA17824P (HITACHI) + 24V
L7805 (SANYO) + 5V
L7807 (SANYO) + 7V
MC7805CT (MOTOROLA) + 5V
MC7806CT (MOTOROLA) + 6V
MC7808CT (MOTOROLA) + 8V
MC7812CT (MOTOROLA) + 12V
MC7815CT (MOTOROLA) + 15V
MC7818CT (MOTOROLA) + 18V
MC7824CT (MOTOROLA) + 24V
NJM7805A (JRC) + 5V
NJM7805K (JRC) + 5V
NJM7806A (JRC) + 6V
NJM7806K (JRC) + 6V
NJM7808A (JRC) + 8V
NJM7808K (JRC) + 8V
NJM7809A (JRC) + 9V
NJM7809K (JRC) + 9V
NJM7812A (JRC) + 12V
NJM7812B (JRC) + 12V
NJM7812K (JRC) + 12V
NJM7815A (JRC) + 15V
NJM7815K (JRC) + 15V
NJM7818A (JRC) + 18V
NJM7818K (JRC) + 18V
NJM7820A (JRC) + 20V
NJM7820K (JRC) + 20V
NJM7824A (JRC) + 24V
NJM7824K (JRC) + 24V

TA78005AP (TOSHIBA) + 5V
TA78005P (TOSHIBA) + 5V
TA78006AP (TOSHIBA) + 6V
TA78006P (TOSHIBA) + 6V
TA78008AP (TOSHIBA) + 8V
TA78008P (TOSHIBA) + 8V
TA78009AP (TOSHIBA) + 9V
TA78009P (TOSHIBA) + 9V
TA78010AP (TOSHIBA) + 10V
TA78010P (TOSHIBA) + 10V
TA78012AP (TOSHIBA) + 12V
TA78012P (TOSHIBA) + 12V
TA78015AP (TOSHIBA) + 15V
TA78015P (TOSHIBA) + 15V
TA78018AP (TOSHIBA) + 18V
TA78018P (TOSHIBA) + 18V
TA78020AP (TOSHIBA) + 20V
TA78020P (TOSHIBA) + 20V
TA78024AP (TOSHIBA) + 24V
TA78024P (TOSHIBA) + 24V
UA7805UC (FSC) + 5V
UA7806UC (FSC) + 6V
UA7808UC (FSC) + 8V
UA7812UC (FSC) + 12V
UA7815UC (FSC) + 15V
UA7818UC (FSC) + 18V
UA7824UC (FSC) + 24V
UA7885UC (FSC) + 8.5V
UPC14305H (NEC) + 5V
UPC14308H (NEC) + 8V
UPC14312H (NEC) + 12V
UPC14315H (NEC) + 15V
UPC14318H (NEC) + 18V
UPC14324H (NEC) + 24V
UPC7805H (NEC) + 5V
UPC7808H (NEC) + 8V
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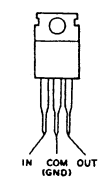
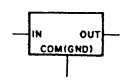
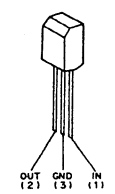
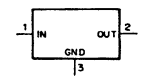




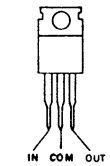
uPC78L05 (NEC) + 5V

POSITIVE VOLTAGE REGULATOR (100mA)

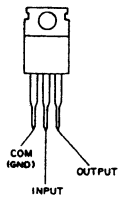


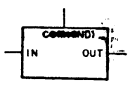


uPC78M08H (NEC) + 8V
POSITIVE VOLTAGE REGULATOR (0.5A)
– SIDE VIEW –



uPC7908H (NEC) – 8V
uPC7912H (NEC) – 12V
NEGATIVE VOLTAGE REGULATOR (1A)
– SIDE VIEW –





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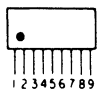

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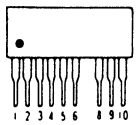

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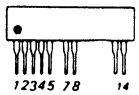

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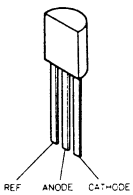

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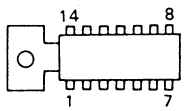

(Top view)

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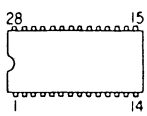
MBM2764-VSGH
MBM27C256A-25CZ



(Top view)

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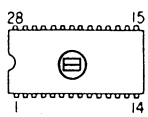
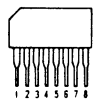


(Top view)

LA7016



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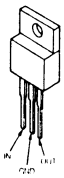

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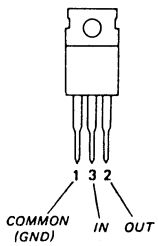

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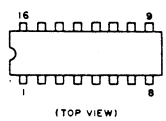

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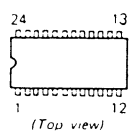

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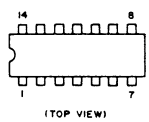

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TBP28L42N-H.SIN
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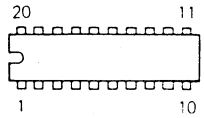

(Top view)

NE555P
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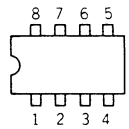

(Top view)

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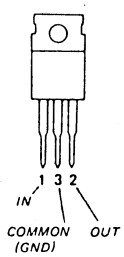

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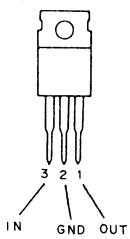

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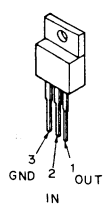

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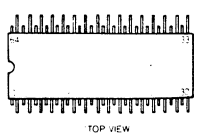

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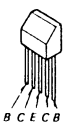

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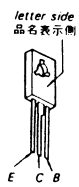

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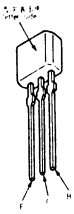

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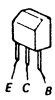

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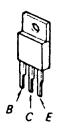

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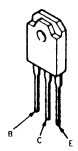

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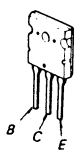

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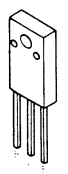

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2SK523-L2

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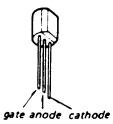
CR02AM-8



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RD11EB2
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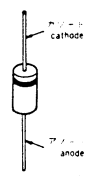

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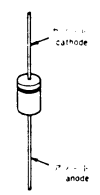
ERC06-15S
ERD31-04
RH-1
RH-1A



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V19C
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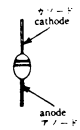
V19G



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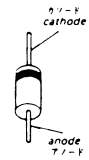
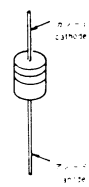
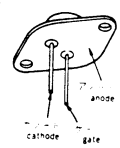


RD5.6ESB1
RD5.6ESB2
RD6.2ESB2
RD6.8ESB1
RD7.5ESB2
RD8.2ESB2
RD9.1ESB1
RD9.1ESB2
RD10ESB2
RD10ESB3
RD11ESB2
RD13EB3
RD13ESB2
RD15ESB1
RD15ESB2
1SS119



SG-264A
SG-264A-0



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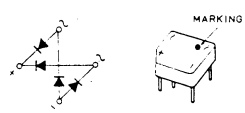

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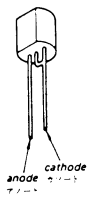

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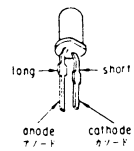
TLY124



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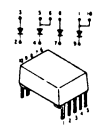

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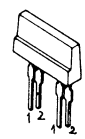
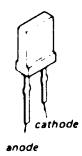


1. anode (アノード)
2. cathode (カソード)

SLP273B-01



SECTION 6
EXPLODED VIEWS

NOTE:

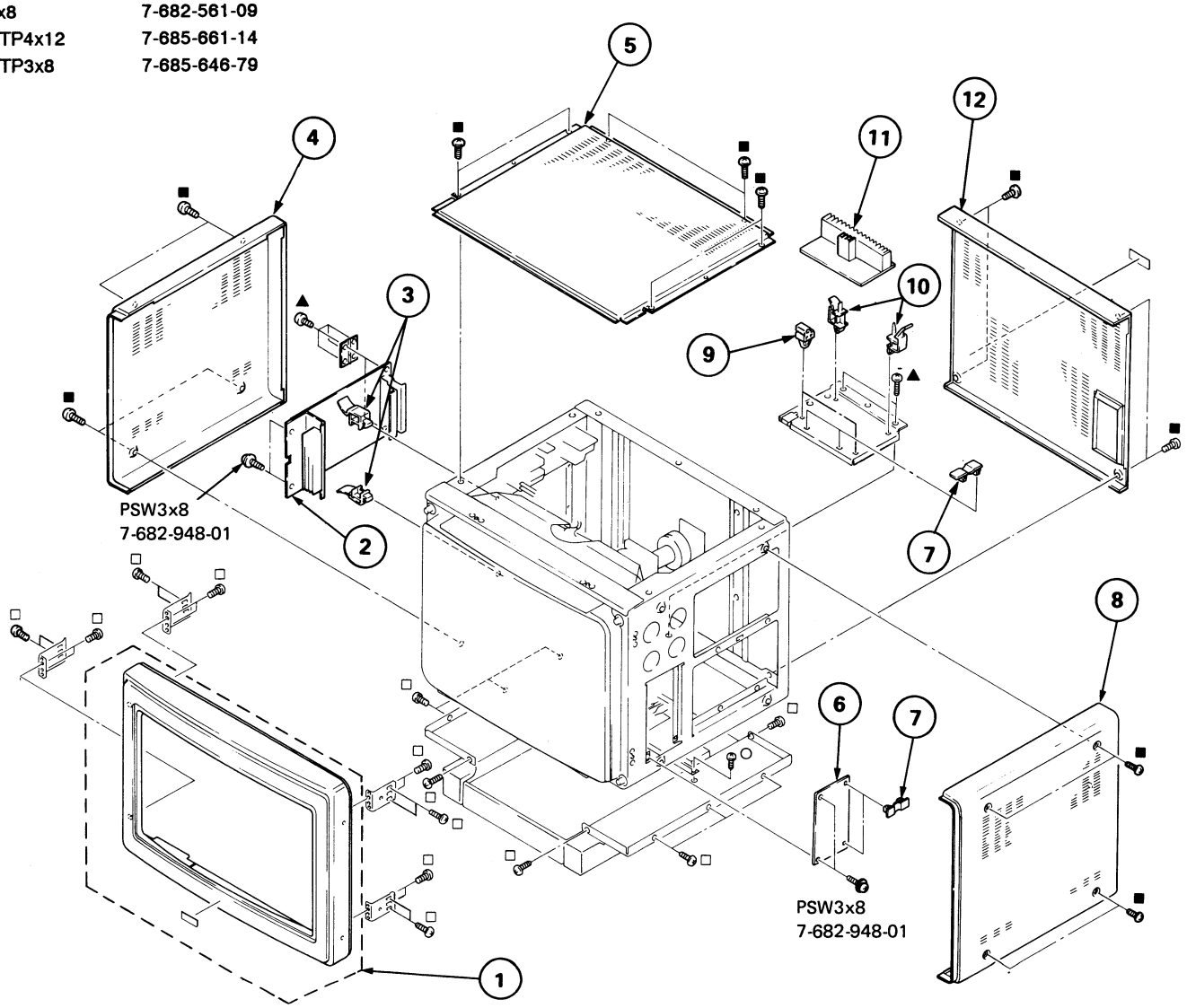
- Items with no part number and no description are not stocked because they are seldom required for routine service.
- The construction parts of an assembled part are indicated with a collation number in the remark column.
- Items marked " * " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

The components identified by shading and mark ⚠ are critical for safety.
Replace only with part number specified.

Les composants identifies par une trame et une marque ⚠ sont critiques pour la securite.
Ne les remplacer que par une piece portant le numero specifie.

6-1. BEZEL

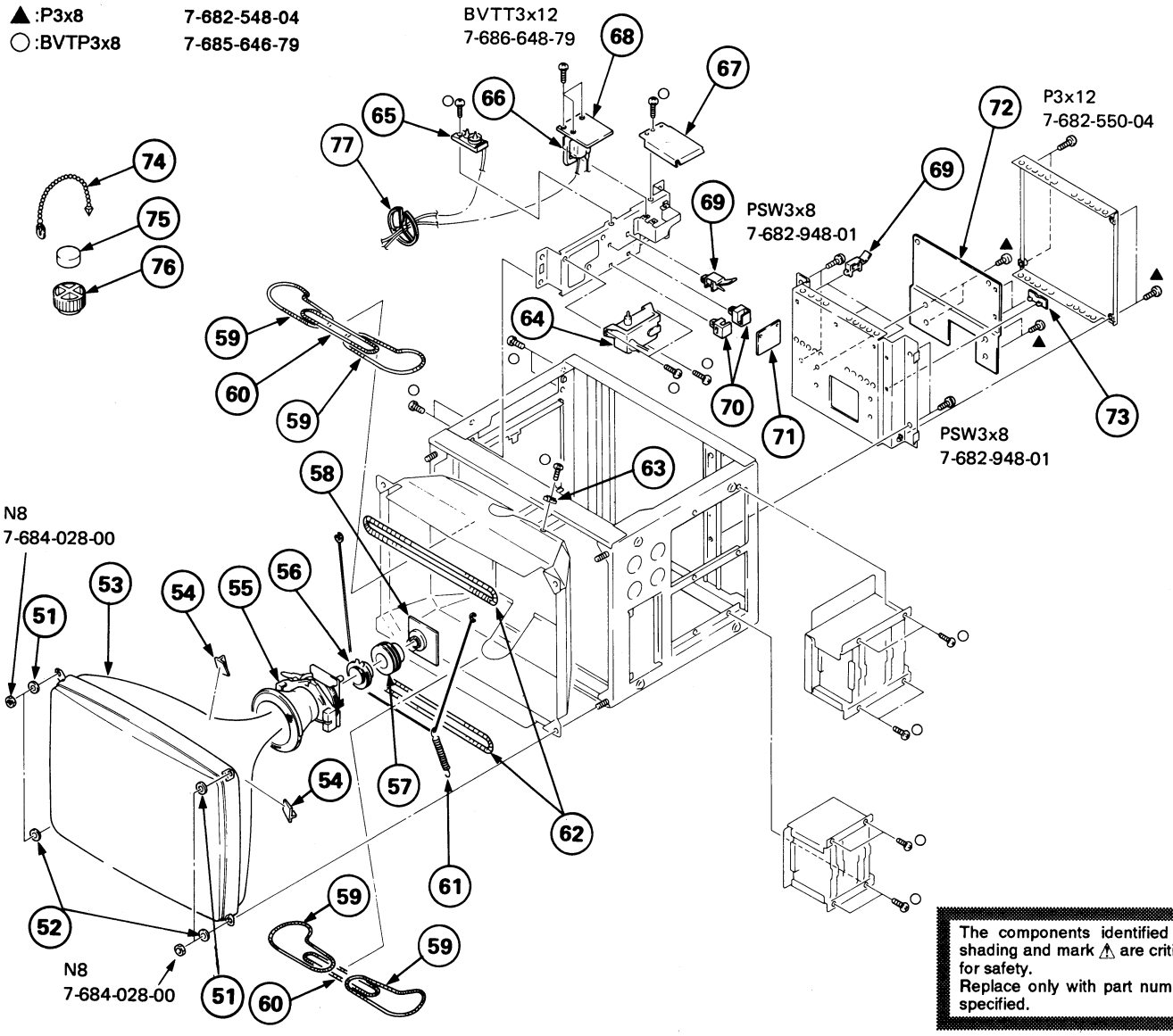
▲ :P3x8	7-682-548-04
■ :B4x8	7-682-561-09
□ :BVTP4x12	7-685-661-14
○ :BVTP3x8	7-685-646-79



Ref. No.	Part No.	Description	Remark
1	X-4378-936-1	BEZEL ASSY	
2	*A-1345-835-A	E BOARD, COMPLETE	
3	*4-321-929-00	HOLDER, PC BOARD	
4	*4-393-002-01	CABINET (L)	
5	*4-393-003-01	CABINET (T)	
6	*A-1235-012-A	R BOARD, COMPLETE	
7	*4-313-732-00	CLIP, HINGE, CIRCUIT BOARD	
8	*4-393-001-01	CABINET (R)	
9	*3-659-682-00	HOLDER, PC BOARD	
10	*3-703-141-00	HOLDER, PCB	
11	*1-626-504-11	GA BOARD	
12	*4-393-004-01	COVER, REAR	

6-2. PICTURE TUBE

▲ :P3x8 7-682-548-04
○ :BVTP3x8 7-685-646-79



The components identified by shading and mark ⚠ are critical for safety.
Replace only with part number specified.

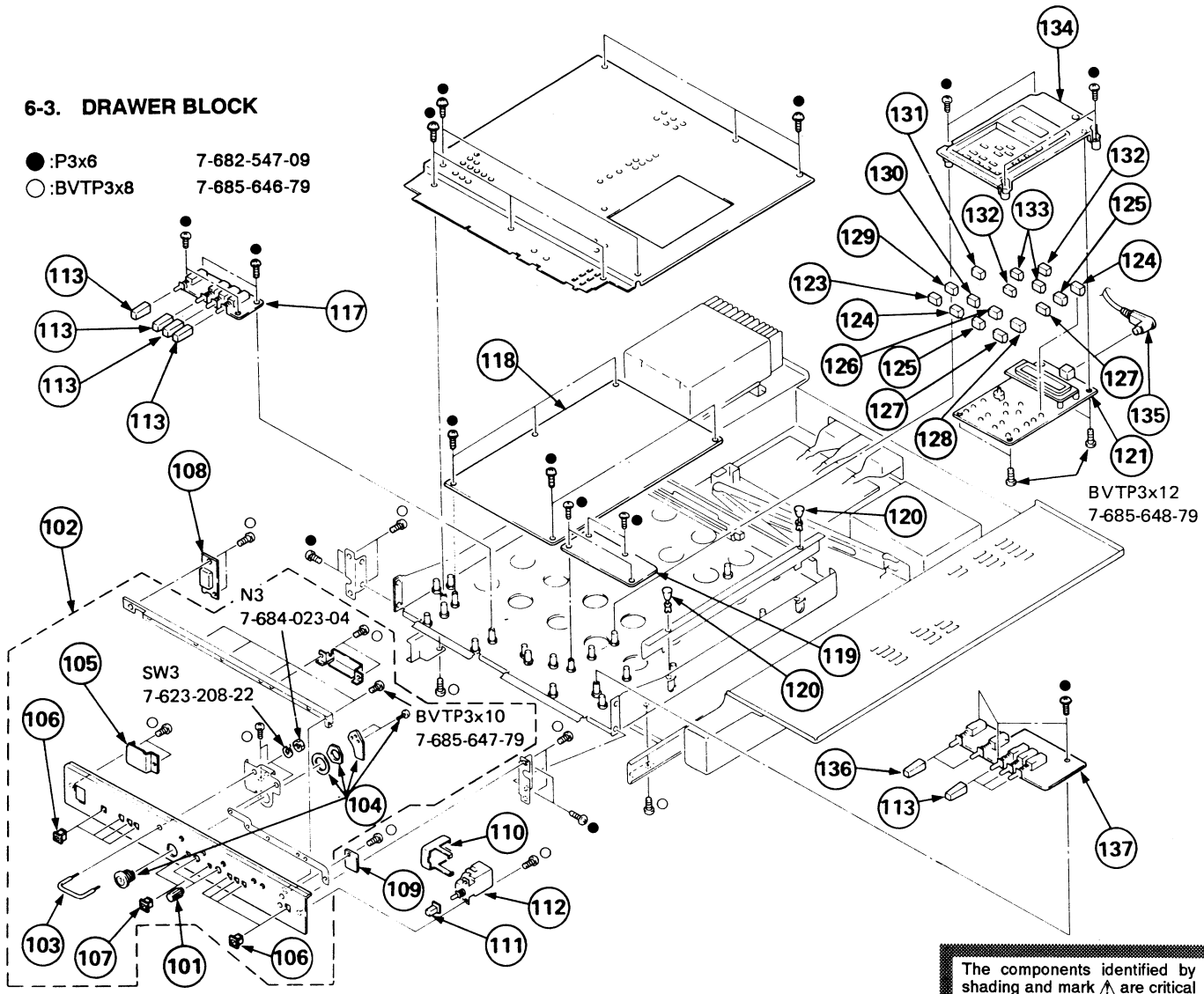
Les composants identifies par une trame et une marque ⚠ sont critiques pour la securite.
Ne les remplacer que par une piece portant le numero specifie.

Ref. No.	Part No.	Description	Remark
51	*4-318-059-00	WASHER, CRT	
52	4-390-485-01	WASHER, CRT	
53	⚠ 8-738-452-75	PICTURE TUBE (M72KCF20X)	
54	3-703-003-00	SPACER, DY	
55	⚠ 1-451-326-11	DEFLECTION YOKE (Y41HDC)	
56	⚠ 1-452-261-22	CRT NECK ASSY (362)	
57	⚠ 1-452-117-31	CRT NECK ASSY	
58	*1-617-465-11	CB BOARD	
59	1-426-293-11	COIL, LANDING CORRECTION (B)	
60	1-426-292-11	COIL, LANDING CORRECTION (A)	
61	4-369-318-00	SPRING, TENSION	
62	⚠ 1-426-294-11	COIL, DEMAGNETIZATION	
63	*4-309-624-00	TERMINAL, EARTH	
64	⚠ 1-453-107-21	HIGH-VOLTAGE BLOCK (DCT BLOCK)	

Ref. No.	Part No.	Description	Remark
65	⚠ 1-230-618-11	RESISTOR ASSY, HIGH-VOLTAGE	
66	⚠ 1-439-381-21	TRANSFORMER ASSY, FLYBACK	
67	*4-383-317-01	COVER, FBT	
68	*1-617-480-11	P BOARD	
69	*3-703-141-00	HOLDER, PCB	
70	*3-701-903-00	HOLDER, PC BOARD	
71	*1-610-380-12	K BOARD	
72	*A-1335-009-A	CA BOARD, COMPLETE	
73	*4-313-732-00	CLIP, HINGE, CIRCUIT BOARD	
74	4-308-870-00	CLIP, LEAD WIRE	
75	1-452-032-00	MAGNET, DISK; 10MM PHI	
76	1-452-094-00	MAGNET, ROTATABLE DISK; 15MM PHI	
77	*3-704-372-01	HOLDER, HV CABLE	

6-3. DRAWER BLOCK

● :P3x6 7-682-547-09
○ :BVTP3x8 7-685-646-79



The components identified by shading and mark ⚠ are critical for safety.
Replace only with part number specified.

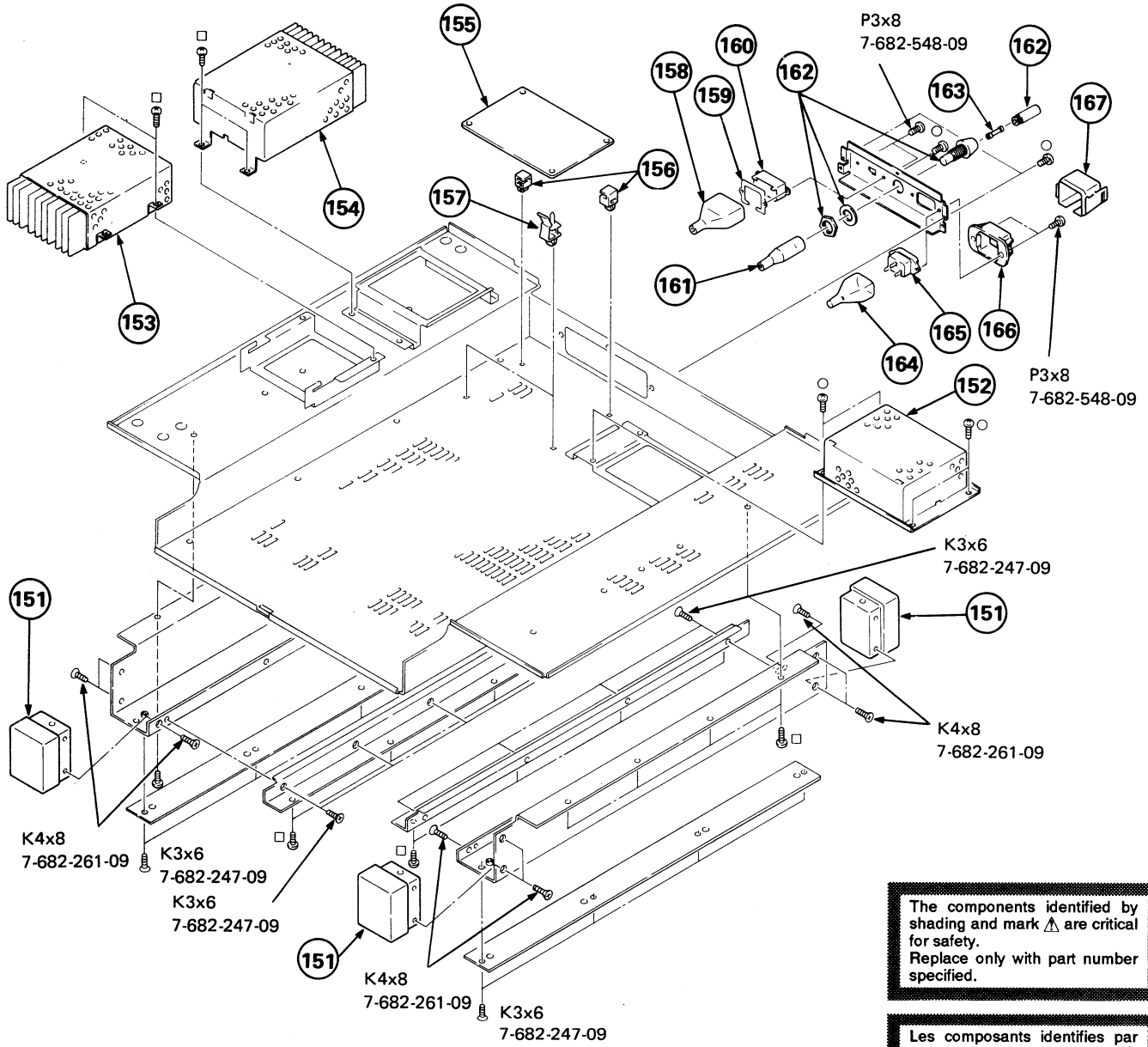
Les composants identifies par une trame et une marque ⚠ sont critiques pour la securite.
Ne les remplacer que par une piece portant le numero specifie.

Ref. No.	Part No.	Description	Remark
101	4-378-916-01	KNOB, VOL	
102	X-4378-937-5	PANEL ASSY, CONTROL	
103	4-335-904-02	HANDLE (S)	
104	4-378-917-01	LOCK, CYLINDER	
105	4-353-701-00	COVER, LAMP	
106	4-379-423-11	ESCUTCHEON (A)	
107	4-379-424-11	ESCUTCHEON (B)	
108	*1-629-774-11	L BOARD	
109	*1-629-771-11	YA BOARD	
110	*4-393-095-01	COVER, POWER SWITCH	
111	4-378-925-11	BUTTON (A)	
112	⚠ 1-571-877-11	SWITCH, PUSH (AC POWER) (1 KEY)	
113	4-374-839-01	BUTTON (A)	
117	*1-627-688-11	JB BOARD	
118	*A-1345-836-A	D BOARD, COMPLETE	
119	*1-619-842-11	W BOARD	
120	3-703-356-00	RIVET, T TYPE	

Ref. No.	Part No.	Description	Remark
121	*A-1394-176-A	N BOARD, COMPLETE	
123	X-4378-914-1	PLATE (IN) ASSY, SWITCH	
124	X-4378-915-1	PLATE (R) ASSY, SWITCH	
125	X-4378-916-1	PLATE (G) ASSY, SWITCH	
126	X-4378-913-1	PLATE (FOR) ASSY, SWITCH	
127	X-4378-917-1	PLATE (B) ASSY, SWITCH	
128	X-4378-909-1	PLATE (CUR) ASSY, SWITCH	
129	X-4378-911-1	PLATE (MODE) ASSY, SWITCH	
130	X-4378-912-1	PLATE (BACK) ASSY, SWITCH	
131	X-4378-910-1	PLATE (APER) ASSY, SWITCH	
132	X-4378-918-1	PLATE (V) ASSY, SWITCH	
133	X-4378-919-1	PLATE (H) ASSY, SWITCH	
134	X-4378-922-1	COVER (N) ASSY	
135	*1-559-134-11	CONNECTOR ASSY	
136	4-378-903-11	BUTTON (B)	
137	*1-626-506-11	JA BOARD	

6-4. BOTTOM CHASSIS

○:BVTP3x8 7-685-646-79
□:BVTP4x12 7-685-661-14



The components identified by shading and mark ⚠ are critical for safety.
Replace only with part number specified.

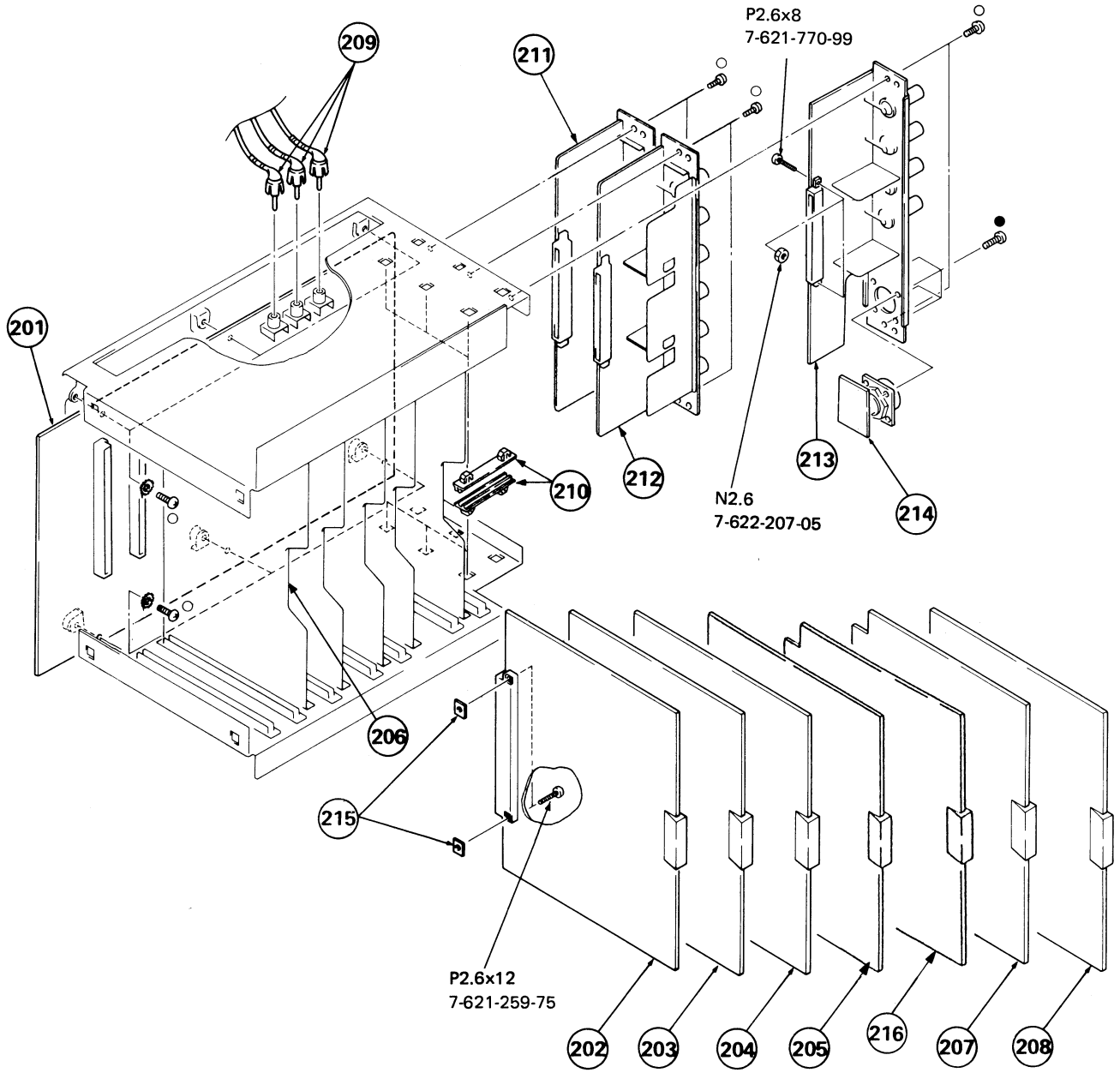
Les composants identifies par une trame et une marque ⚠ sont critiques pour la securite.
Ne les remplacer que par une piece portant le numero specifie.

Ref. No.	Part No.	Description	Remark
151	*4-390-488-01	CAP	
152	1-413-227-11	SWITCHING REGULATOR (CR-15EN)	
153	⚠ 1-413-287-12	REGULATOR, SWITCHING (TK-18)	
154	⚠ 1-413-251-13	SWITCHING REGULATOR (SF-11)	
155	*1-619-844-11	F BOARD	
156	*3-701-903-00	HOLDER, PC BOARD	
157	*3-703-141-00	HOLDER, PCB	
158	*4-371-879-02	COVER, AC SELECT	
159	*4-379-409-01	NUT, PLATE	
160	⚠ 1-570-173-22	SWITCH, VOLTAGE CHANGE	

Ref. No.	Part No.	Description	Remark
161	*4-393-031-01	COVER, FUSE HOLDER	
162	1-533-224-11	HOLDER, FUSE (DIA. 5.2)	
163	⚠ 1-532-350-11	FUSE, TIME-LAG 4A/250V (HDM-2830E ONLY)	
163	⚠ 1-532-748-11	FUSE, GLASS TUBE (6.3A/125V)	(HDM-2830 ONLY)
164	4-601-466-11	COVER, 3P INLET	
165	⚠ 1-560-222-11	INLET 3P	
166	*2-990-241-01	HOLDER (A), PLUG	
167	*2-990-242-01	HOLDER (B), PLUG	

6-5. SIGNAL BLOCK

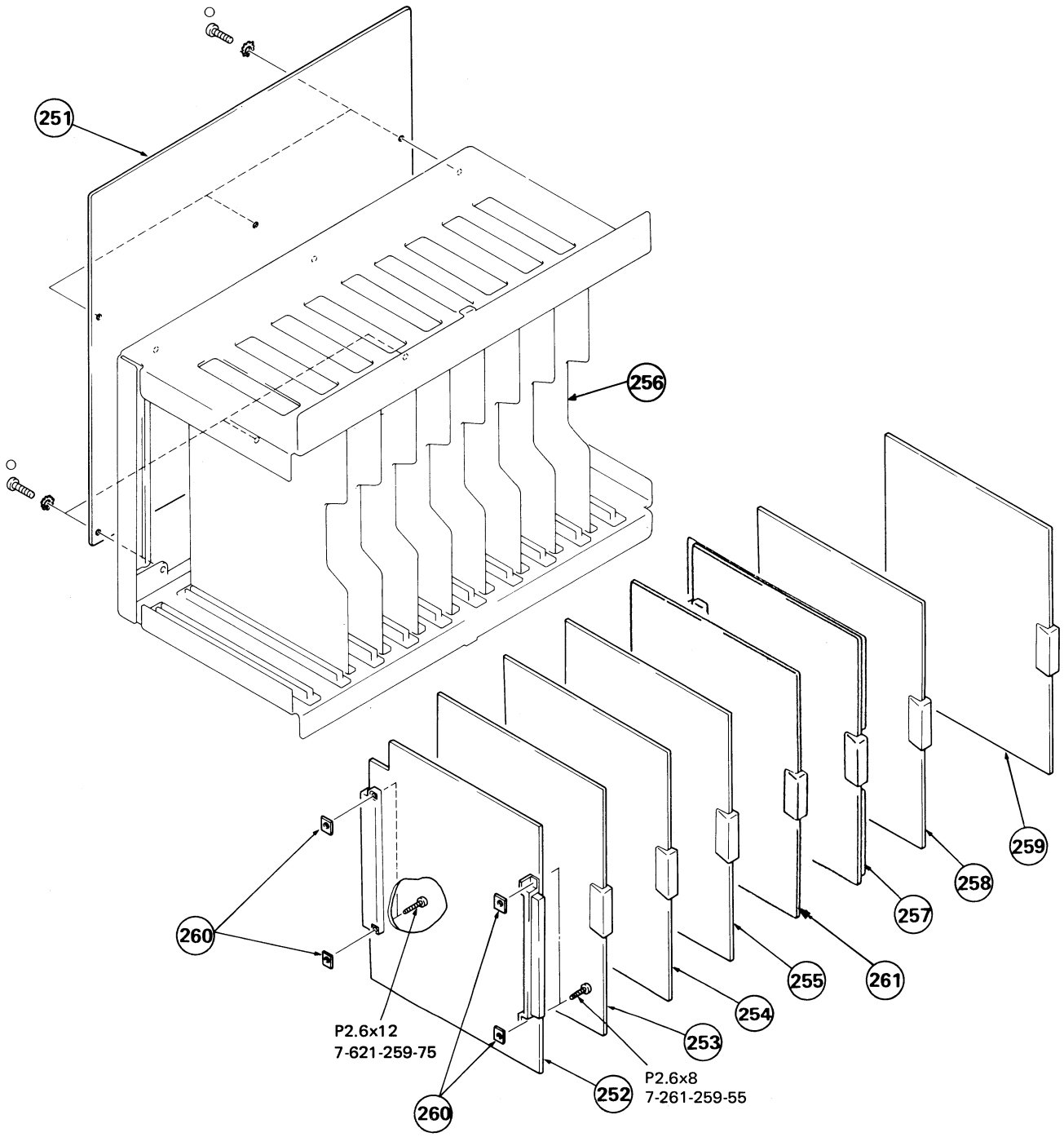
● :P3x6 7-682-547-09
○ :BVTP3x8 7-685-646-79



Ref. No.	Part No.	Description	Remark
201	*1-626-497-11	BN BOARD	
202	*A-1296-453-A	BG BOARD, COMPLETE	
203	*A-1296-452-A	BF BOARD, COMPLETE	
204	*A-1296-451-A	BE BOARD, COMPLETE	
205	*A-1135-525-A	BD BOARD, COMPLETE	
206	*4-378-928-01	PLATE, SHIELD	
207	*A-1296-450-A	BB BOARD, COMPLETE	
208	*A-1135-524-A	BA BOARD, COMPLETE	
209	*1-557-152-81	CABLE, PIN	
210	*3-680-613-11	SUPPORT, PC BOARD	
211	*A-1275-090-A	QB BOARD, COMPLETE	
212	*A-1275-089-A	QA BOARD, COMPLETE	
213	*A-1275-069-A	QC BOARD, COMPLETE	
214	*1-617-479-11	QD BOARD	
215	4-378-915-01	NUT (M2.6), PLATE	
216	*A-1296-194-A	BC BOARD, COMPLETE	

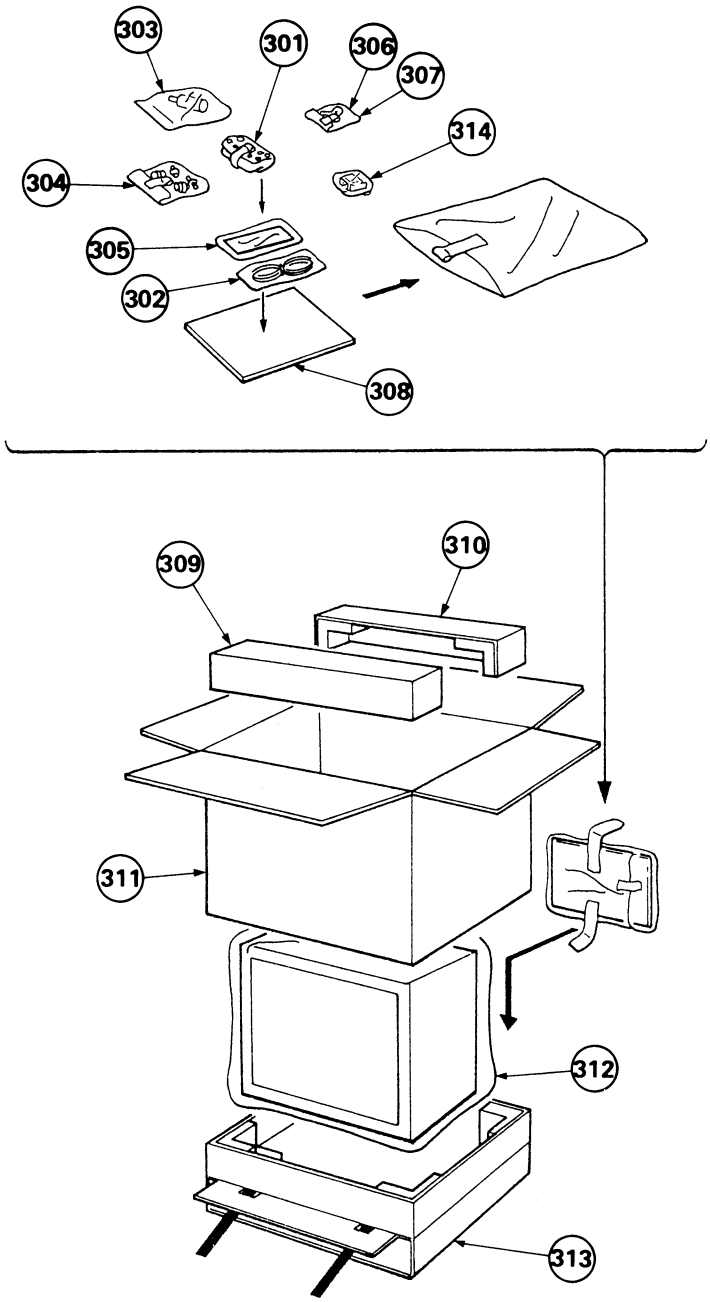
6-6. Z BLOCK

○:BVTP3x8 7-685-646-79



Ref. No.	Part No.	Description	Remark
251	*1-626-502-11	ZN BOARD	
252	*A-1389-709-A	XA BOARD, COMPLETE	
253	*A-1345-652-A	DC BOARD, COMPLETE	
254	*A-1345-651-A	DB BOARD, COMPLETE	
255	*A-1345-650-A	DA BOARD, COMPLETE	
256	*4-378-928-01	PLATE, SHIELD	
257	*A-1394-168-A	ZD BOARD, COMPLETE	
258	*A-1394-143-A	ZC BOARD, COMPLETE	
259	*A-1394-142-A	ZA BOARD, COMPLETE	
260	4-378-915-01	NUT (M2.6), PLATE	
261	*A-1394-098-A	ZE BOARD, COMPLETE	

6-7. PACKING



The components identified by shading and mark ⚠ are critical for safety.
Replace only with part number specified.

Les composants identifies par une trame et une marque ⚠ sont critiques pour la securite.
Ne les remplacer que par une piece portant le numero specifie.

Ref. No.	Part No.	Description	Remark
301	⚠ 1-532-748-11	FUSE, GLASS, TUBE 6.3A/125V (HDM-2830 ONLY)	
	⚠ 1-532-350-11	FUSE, TIME-LAG 4A/250V (HDM-2830E ONLY)	
302	⚠ 1-551-812-11	POWER CORD (HDM-2830 ONLY)	
	⚠ 1-534-819-14	POWER CORD (HDM-2830E ONLY)	
303	1-560-776-00	SOCKET, CONNECTOR 10P	
304	1-564-662-11	PLUG, BNC (75 OHM) (HDM-2830E ONLY)	
305	4-353-737-00	PLATE, NUMBER, TALLY	
306	4-378-901-01	KEY	
307	7-700-731-03	DRIVER, VR ADJUSTMENT	
308	4-390-486-11	MANUAL, OPERATION & MAINTENANCE	
309	*4-383-359-01	CUSHION (UPPER FRONT)	
310	*4-383-360-01	CUSHION (UPPER REAR)	
311	*4-393-030-02	INDIVIDUAL CARTON (HDM-2830 ONLY)	
	*4-393-021-02	INDIVIDUAL CARTON (HDM-2830E ONLY)	
312	*4-359-683-00	BAG, PROTECTION	
313	*X-4378-950-2	TABLE ASSY, BOTTOM	
314	*2-990-242-01	HOLDER (B), PLUG	

SECTION 7
ELECTRICAL PARTS LIST

BA

NOTE:

The components identified by shading and mark ⚠ are critical for safety.
Replace only with part number specified.

Les composants identifies par une trame et une marque ⚠ sont critiques pour la securite.
Ne les remplacer que par une piece portant le numero specifie.

- Items marked " * " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.

RESISTORS
- All resistors are in ohms
- F : nonflammable

When indicating parts by reference number, please include the board name.

CAPACITORS
- MF : μF, PF : μμF

COILS
- MMH : mH, UH : μH

- The components identified by ⊠ in this manual have been carefully factory-selected for each set in order to satisfy regulations regarding X-ray radiation. Should replacement be required, replace only with the value originally used.

Ref. No.	Part No.	Description				Remark
	*A-1135-524-A	BA BOARD, COMPLETE				
		**********				
	*4-353-708-00	HOOK, FINGER				
		<CONNECTOR>				
BA1	*1-562-729-11	CONNECTOR, MULTI 64P				
	4-378-915-01	NUT (M2.6), PLATE; BA1				
BA2	*1-562-454-11	CONNECTOR 15P				
BA3	*1-562-454-11	CONNECTOR 15P				
BA4	*1-562-455-11	CONNECTOR 22P				
		<CAPACITOR>				
C101	1-126-233-11	ELECT	22MF	20%	25V	
C102	1-101-004-00	CERAMIC	0.01MF		50V	
C103	1-101-004-00	CERAMIC	0.01MF		50V	
C104	1-126-233-11	ELECT	22MF	20%	25V	
C105	1-101-004-00	CERAMIC	0.01MF		50V	
C106	1-126-233-11	ELECT	22MF	20%	25V	
C107	1-101-004-00	CERAMIC	0.01MF		50V	
C108	1-101-004-00	CERAMIC	0.01MF		50V	
C109	1-126-233-11	ELECT	22MF	20%	25V	
C110	1-126-233-11	ELECT	22MF	20%	25V	
C111	1-101-004-00	CERAMIC	0.01MF		50V	
C114	1-101-004-00	CERAMIC	0.01MF		50V	
C115	1-126-233-11	ELECT	22MF	20%	25V	
C116	1-101-004-00	CERAMIC	0.01MF		50V	
C117	1-101-004-00	CERAMIC	0.01MF		50V	
C120	1-101-004-00	CERAMIC	0.01MF		50V	
C121	1-126-233-11	ELECT	22MF	20%	25V	
C122	1-126-233-11	ELECT	22MF	20%	25V	
C123	1-101-004-00	CERAMIC	0.01MF		50V	
C124	1-101-004-00	CERAMIC	0.01MF		50V	
C125	1-126-233-11	ELECT	22MF	20%	25V	
C126	1-101-004-00	CERAMIC	0.01MF		50V	
C128	1-126-233-11	ELECT	22MF	20%	25V	
C201	1-124-282-00	ELECT	22MF	20%	16V	
C203	1-124-631-11	ELECT	47MF	20%	16V	
C205	1-126-233-11	ELECT	22MF	20%	25V	
C207	1-126-233-11	ELECT	22MF	20%	25V	
C208	1-126-233-11	ELECT	22MF	20%	25V	
C209	1-126-233-11	ELECT	22MF	20%	25V	
C210	1-126-233-11	ELECT	22MF	20%	25V	
C211	1-126-233-11	ELECT	22MF	20%	25V	
C212	1-101-004-00	CERAMIC	0.01MF		50V	
C213	1-101-004-00	CERAMIC	0.01MF		50V	
C214	1-126-233-11	ELECT	22MF	20%	25V	
C215	1-101-004-00	CERAMIC	0.01MF		50V	
C217	1-126-233-11	ELECT	22MF	20%	25V	
C219	1-126-233-11	ELECT	22MF	20%	25V	
C220	1-126-233-11	ELECT	22MF	20%	25V	
C221	1-101-004-00	CERAMIC	0.01MF		50V	
C222	1-101-004-00	CERAMIC	0.01MF		50V	
C223	1-126-233-11	ELECT	22MF	20%	25V	
C224	1-124-631-11	ELECT	47MF	20%	16V	
C301	1-101-004-00	CERAMIC	0.01MF		50V	
C302	1-126-233-11	ELECT	22MF	20%	25V	
C303	1-101-004-00	CERAMIC	0.01MF		50V	
C304	1-126-233-11	ELECT	22MF	20%	25V	
C305	1-124-791-11	ELECT	1MF	20%	50V	
C306	1-126-233-11	ELECT	22MF	20%	25V	
C307	1-126-233-11	ELECT	22MF	20%	25V	
C308	1-101-004-00	CERAMIC	0.01MF		50V	
C309	1-101-004-00	CERAMIC	0.01MF		50V	
C310	1-126-101-11	ELECT	100MF	20%	16V	
C311	1-126-101-11	ELECT	100MF	20%	16V	
C312	1-126-233-11	ELECT	22MF	20%	25V	
C313	1-126-233-11	ELECT	22MF	20%	25V	
C314	1-101-004-00	CERAMIC	0.01MF		50V	
C315	1-101-004-00	CERAMIC	0.01MF		50V	
C316	1-124-120-11	ELECT	220MF	20%	25V	
C317	1-124-120-11	ELECT	220MF	20%	25V	
C318	1-124-477-11	ELECT	47MF	20%	25V	
C319	1-124-477-11	ELECT	47MF	20%	25V	
C320	1-101-004-00	CERAMIC	0.01MF		50V	
C321	1-126-233-11	ELECT	22MF	20%	25V	
C322	1-101-004-00	CERAMIC	0.01MF		50V	
C323	1-126-233-11	ELECT	22MF	20%	25V	
C324	1-124-791-11	ELECT	1MF	20%	50V	
C325	1-126-233-11	ELECT	22MF	20%	25V	
C326	1-126-233-11	ELECT	22MF	20%	25V	
C327	1-101-004-00	CERAMIC	0.01MF		50V	
C328	1-126-233-11	ELECT	22MF	20%	25V	
C329	1-101-004-00	CERAMIC	0.01MF		50V	
C330	1-126-233-11	ELECT	22MF	20%	25V	
C331	1-124-791-11	ELECT	1MF	20%	50V	
C332	1-126-233-11	ELECT	22MF	20%	25V	
C333	1-126-233-11	ELECT	22MF	20%	25V	
C334	1-124-791-11	ELECT	1MF	20%	50V	
C335	1-124-791-11	ELECT	1MF	20%	50V	
C336	1-124-791-11	ELECT	1MF	20%	50V	
C337	1-124-791-11	ELECT	1MF	20%	50V	
C338	1-124-791-11	ELECT	1MF	20%	50V	
C339	1-124-791-11	ELECT	1MF	20%	50V	
C340	1-101-004-00	CERAMIC	0.01MF		50V	

BA

Ref. No.	Part No.	Description	Remark
		<DIODE>	
D101	8-719-110-41	DIODE RD15EB2	
D200	8-719-153-90	DIODE RD13EB3TN	
D201	8-719-911-19	DIODE 1SS119	
D203	8-719-911-19	DIODE 1SS119	
D205	8-719-110-41	DIODE RD15EB2	
D207	8-719-911-19	DIODE 1SS119	
D208	8-719-911-19	DIODE 1SS119	
D209	8-719-911-19	DIODE 1SS119	
D210	8-719-911-19	DIODE 1SS119	
D211	8-719-911-19	DIODE 1SS119	
D212	8-719-911-19	DIODE 1SS119	
D213	8-719-911-19	DIODE 1SS119	
D214	8-719-911-19	DIODE 1SS119	
D215	8-719-911-19	DIODE 1SS119	
D216	8-719-911-19	DIODE 1SS119	
D301	8-719-901-95	DIODE V19CSS	
D302	8-719-901-95	DIODE V19CSS	
D305	8-719-911-19	DIODE 1SS119	
D306	8-719-911-19	DIODE 1SS119	
D307	8-719-911-19	DIODE 1SS119	
D308	8-719-911-19	DIODE 1SS119	
		<IC>	
IC101	8-759-800-81	IC LA7016	
IC102	8-759-800-81	IC LA7016	
IC103	8-759-800-81	IC LA7016	
IC202	8-759-800-81	IC LA7016	
IC203	8-759-250-24	IC TC5024BP	
IC204	8-759-250-25	IC TC5025BP	
IC301	8-759-400-29	IC AN78L04	
IC303	8-759-982-46	IC RC79L08A	
IC305	8-759-602-66	IC M5230L-A	
IC306	8-759-602-66	IC M5230L-A	
IC307	8-759-602-66	IC M5230L-A	
		<TRANSISTOR>	
Q101	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q102	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q103	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q200	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q201	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q202	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q203	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q204	8-729-378-84	TRANSISTOR 2SD788-3	
Q301	8-729-378-84	TRANSISTOR 2SD788-3	
Q302	8-729-600-82	TRANSISTOR 2SA1282-F	
Q303	8-729-378-84	TRANSISTOR 2SD788-3	
Q304	8-729-600-82	TRANSISTOR 2SA1282-F	
Q305	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q306	8-729-378-84	TRANSISTOR 2SD788-3	
Q307	8-729-600-82	TRANSISTOR 2SA1282-F	
		<RESISTOR>	
R100	1-249-405-11	CARBON 100 5% 1/4W	
R101	1-249-437-11	CARBON 47K 5% 1/4W	
R102	1-249-437-11	CARBON 47K 5% 1/4W	
R103	1-249-437-11	CARBON 47K 5% 1/4W	
R104	1-249-405-11	CARBON 100 5% 1/4W	
R105	1-249-405-11	CARBON 100 5% 1/4W	
R106	1-249-405-11	CARBON 100 5% 1/4W	
R107	1-249-405-11	CARBON 100 5% 1/4W	
R108	1-249-421-11	CARBON 2.2K 5% 1/4W	
R109	1-215-393-00	METAL 68 1% 1/6W	
R110	1-249-405-11	CARBON 100 5% 1/4W	
R111	1-249-405-11	CARBON 100 5% 1/4W	
R112	1-249-405-11	CARBON 100 5% 1/4W	
R113	1-249-405-11	CARBON 100 5% 1/4W	
R114	1-249-405-11	CARBON 100 5% 1/4W	
R115	1-249-421-11	CARBON 2.2K 5% 1/4W	
R116	1-249-405-11	CARBON 100 5% 1/4W	
R117	1-249-405-11	CARBON 100 5% 1/4W	
R118	1-215-393-00	METAL 68 1% 1/6W	
R119	1-249-437-11	CARBON 47K 5% 1/4W	
R120	1-249-437-11	CARBON 47K 5% 1/4W	
R121	1-249-437-11	CARBON 47K 5% 1/4W	
R122	1-249-405-11	CARBON 100 5% 1/4W	
R123	1-249-405-11	CARBON 100 5% 1/4W	
R124	1-249-435-11	CARBON 33K 5% 1/4W	
R125	1-249-405-11	CARBON 100 5% 1/4W	
R126	1-249-427-11	CARBON 6.8K 5% 1/4W	
R127	1-249-405-11	CARBON 100 5% 1/4W	
R128	1-249-421-11	CARBON 2.2K 5% 1/4W	
R129	1-215-393-00	METAL 68 1% 1/6W	
R130	1-249-405-11	CARBON 100 5% 1/4W	
R201	1-249-437-11	CARBON 47K 5% 1/4W	
R203	1-249-465-11	CARBON 47K 5% 1/4W	
R205	1-249-465-11	CARBON 47K 5% 1/4W	
R207	1-247-901-11	CARBON 820K 5% 1/4W	
R209	1-247-901-11	CARBON 820K 5% 1/4W	
R211	1-249-405-11	CARBON 100 5% 1/4W	
R213	1-249-405-11	CARBON 100 5% 1/4W	
R215	1-249-405-11	CARBON 100 5% 1/4W	
R219	1-249-405-11	CARBON 100 5% 1/4W	
R220	1-249-405-11	CARBON 100 5% 1/4W	
R222	1-249-421-11	CARBON 2.2K 5% 1/4W	
R223	1-249-405-11	CARBON 100 5% 1/4W	
R224	1-249-405-11	CARBON 100 5% 1/4W	
R225	1-249-405-11	CARBON 100 5% 1/4W	
R226	1-249-421-11	CARBON 2.2K 5% 1/4W	
R227	1-215-393-00	METAL 68 1% 1/6W	
R228	1-215-393-00	METAL 68 1% 1/6W	
R229	1-249-405-11	CARBON 100 5% 1/4W	
R230	1-249-417-11	CARBON 1K 5% 1/4W	
R231	1-249-427-11	CARBON 6.8K 5% 1/4W	
R232	1-249-405-11	CARBON 100 5% 1/4W	
R233	1-249-435-11	CARBON 33K 5% 1/4W	
R234	1-249-421-11	CARBON 2.2K 5% 1/4W	
R235	1-249-417-11	CARBON 1K 5% 1/4W	
R236	1-215-393-00	METAL 68 1% 1/6W	
R237	1-249-405-11	CARBON 100 5% 1/4W	
R238	1-249-437-11	CARBON 47K 5% 1/4W	
R239	1-249-437-11	CARBON 47K 5% 1/4W	
R240	1-249-437-11	CARBON 47K 5% 1/4W	
R241	1-249-437-11	CARBON 47K 5% 1/4W	
R242	1-249-437-11	CARBON 47K 5% 1/4W	
R243	1-249-427-11	CARBON 6.8K 5% 1/4W	
R244	1-249-427-11	CARBON 6.8K 5% 1/4W	

Ref. No.	Part No.	Description				Remark
R245	1-249-427-11	CARBON	6.8K	5%	1/4W	
R246	1-249-427-11	CARBON	6.8K	5%	1/4W	
R247	1-249-427-11	CARBON	6.8K	5%	1/4W	
R248	1-249-427-11	CARBON	6.8K	5%	1/4W	
R249	1-249-405-11	CARBON	100	5%	1/4W	
R250	1-249-405-11	CARBON	100	5%	1/4W	
R251	1-249-427-11	CARBON	6.8K	5%	1/4W	
R252	1-249-427-11	CARBON	6.8K	5%	1/4W	
R253	1-249-427-11	CARBON	6.8K	5%	1/4W	
R254	1-249-427-11	CARBON	6.8K	5%	1/4W	
R255	1-249-437-11	CARBON	47K	5%	1/4W	
R256	1-249-437-11	CARBON	47K	5%	1/4W	
R257	1-249-437-11	CARBON	47K	5%	1/4W	
R258	1-249-437-11	CARBON	47K	5%	1/4W	
R259	1-249-393-11	CARBON	10	5%	1/4W	
R260	1-249-405-11	CARBON	100	5%	1/4W	
R261	1-247-901-11	CARBON	820K	5%	1/4W	
R263	1-249-441-11	CARBON	100K	5%	1/4W	
R301	1-215-447-00	METAL	12K	1%	1/6W	
R302	1-215-442-00	METAL	7.5K	1%	1/6W	
R303	1-215-427-00	METAL	1.8K	1%	1/6W	
R304	1-215-447-00	METAL	12K	1%	1/6W	
R305	1-247-903-00	CARBON	1M	5%	1/4W	
R306	1-215-447-00	METAL	12K	1%	1/6W	
R307	1-215-447-00	METAL	12K	1%	1/6W	
R308	1-215-442-00	METAL	7.5K	1%	1/6W	
R309	1-215-427-00	METAL	1.8K	1%	1/6W	
R310	1-247-903-00	CARBON	1M	5%	1/4W	
R311	1-249-441-11	CARBON	100K	5%	1/4W	
R312	1-215-447-00	METAL	12K	1%	1/6W	
R313	1-215-442-00	METAL	7.5K	1%	1/6W	
R314	1-215-427-00	METAL	1.8K	1%	1/6W	
R315	1-215-447-00	METAL	12K	1%	1/6W	
R316	1-247-903-00	CARBON	1M	5%	1/4W	
R317	1-249-429-11	CARBON	10K	5%	1/4W	
R318	1-249-405-11	CARBON	100	5%	1/4W	

<SWITCH>

S1	*1-561-724-00	SOCKET, CONNECTOR 2P
S1	*1-564-431-11	POST, CONNECTOR 3P

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	*A-1135-525-A	BD BOARD, COMPLETE
		**********
	*4-353-708-00	HOOK, FINGER
	4-378-915-01	NUT (M2.6), PLATE

<CONNECTOR>

BD1	*1-562-729-11	CONNECTOR, MULTI 64P

<CAPACITOR>

C001	1-123-382-00	ELECT	3.3MF	20%	50V
C002	1-123-382-00	ELECT	3.3MF	20%	50V
C003	1-123-382-00	ELECT	3.3MF	20%	50V
C004	1-123-382-00	ELECT	3.3MF	20%	50V
C005	1-123-382-00	ELECT	3.3MF	20%	50V
C006	1-123-382-00	ELECT	3.3MF	20%	50V
C009	1-101-004-00	CERAMIC	0.01MF		50V

Ref. No.	Part No.	Description				Remark
C011	1-123-334-00	ELECT	220MF	20%	25V	
C012	1-123-332-00	ELECT	47MF	20%	25V	
C013	1-101-004-00	CERAMIC	0.01MF		50V	
C014	1-101-004-00	CERAMIC	0.01MF		50V	
C016	1-123-334-00	ELECT	220MF	20%	25V	
C017	1-123-332-00	ELECT	47MF	20%	25V	
C018	1-101-004-00	CERAMIC	0.01MF		50V	
C019	1-101-004-00	CERAMIC	0.01MF		50V	
C101	1-124-122-11	ELECT	100MF	20%	16V	
C102	1-101-004-00	CERAMIC	0.01MF		50V	
C103	1-124-122-11	ELECT	100MF	20%	16V	
C104	1-101-004-00	CERAMIC	0.01MF		50V	
C105	1-102-942-00	CERAMIC	5PF	1PF	50V	
C106	1-124-963-11	ELECT	33MF	20%	16V	
C107	1-136-173-00	FILM	0.47MF	5%	50V	
C108	1-136-173-00	FILM	0.47MF	5%	50V	
C109	1-101-004-00	CERAMIC	0.01MF		50V	
C110	1-123-330-00	ELECT	22MF	20%	25V	
C111	1-123-330-00	ELECT	22MF	20%	25V	
C112	1-123-330-00	ELECT	22MF	20%	25V	
C113	1-123-330-00	ELECT	22MF	20%	25V	
C114	1-124-963-11	ELECT	33MF	20%	16V	
C115	1-101-004-00	CERAMIC	0.01MF		50V	
C116	1-124-963-11	ELECT	33MF	20%	16V	
C117	1-101-004-00	CERAMIC	0.01MF		50V	
C118	1-124-963-11	ELECT	33MF	20%	16V	
C119	1-136-169-00	FILM	0.22MF	5%	50V	
C120	1-101-004-00	CERAMIC	0.01MF		50V	
C121	1-136-165-00	FILM	0.1MF	5%	50V	
C122	1-101-004-00	CERAMIC	0.01MF		50V	
C123	1-102-942-00	CERAMIC	5PF	1PF	50V	
C124	1-123-330-00	ELECT	22MF	20%	25V	
C125	1-123-330-00	ELECT	22MF	20%	25V	
C126	1-136-173-00	FILM	0.47MF	5%	50V	
C127	1-101-004-00	CERAMIC	0.01MF		50V	
C129	1-101-004-00	CERAMIC	0.01MF		50V	
C131	1-101-004-00	CERAMIC	0.01MF		50V	
C132	1-101-004-00	CERAMIC	0.01MF		50V	
C133	1-101-004-00	CERAMIC	0.01MF		50V	
C134	1-102-963-00	CERAMIC	33PF	5%	50V	
C135	1-101-004-00	CERAMIC	0.01MF		50V	
C137	1-102-951-00	CERAMIC	15PF	5%	50V	
C138	1-101-004-00	CERAMIC	0.01MF		50V	
C139	1-101-004-00	CERAMIC	0.01MF		50V	
C201	1-124-122-11	ELECT	100MF	20%	16V	
C202	1-101-004-00	CERAMIC	0.01MF		50V	
C203	1-124-122-11	ELECT	100MF	20%	16V	
C204	1-101-004-00	CERAMIC	0.01MF		50V	
C205	1-102-942-00	CERAMIC	5PF	1PF	50V	
C206	1-124-963-11	ELECT	33MF	20%	16V	
C207	1-136-173-00	FILM	0.47MF	5%	50V	
C208	1-136-173-00	FILM	0.47MF	5%	50V	
C209	1-101-004-00	CERAMIC	0.01MF		50V	
C210	1-123-330-00	ELECT	22MF	20%	25V	
C211	1-123-330-00	ELECT	22MF	20%	25V	
C212	1-123-330-00	ELECT	22MF	20%	25V	
C213	1-123-330-00	ELECT	22MF	20%	25V	
C214	1-124-963-11	ELECT	33MF	20%	16V	
C215	1-101-004-00	CERAMIC	0.01MF		50V	
C216	1-124-963-11	ELECT	33MF	20%	16V	
C217	1-101-004-00	CERAMIC	0.01MF		50V	
C218	1-124-963-11	ELECT	33MF	20%	16V	

BD

Ref. No.	Part No.	Description				Remark
C219	1-136-169-00	FILM	0.22MF	5%	50V	
C220	1-101-004-00	CERAMIC	0.01MF		50V	
C221	1-136-165-00	FILM	0.1MF	5%	50V	
C222	1-101-004-00	CERAMIC	0.01MF		50V	
C223	1-102-942-00	CERAMIC	5PF	1PF	50V	
C224	1-123-330-00	ELECT	22MF	20%	25V	
C225	1-123-330-00	ELECT	22MF	20%	25V	
C226	1-136-173-00	FILM	0.47MF	5%	50V	
C227	1-101-004-00	CERAMIC	0.01MF		50V	
C229	1-101-004-00	CERAMIC	0.01MF		50V	
C231	1-101-004-00	CERAMIC	0.01MF		50V	
C232	1-101-004-00	CERAMIC	0.01MF		50V	
C233	1-101-004-00	CERAMIC	0.01MF		50V	
C234	1-102-963-00	CERAMIC	33PF	5%	50V	
C235	1-101-004-00	CERAMIC	0.01MF		50V	
C237	1-102-951-00	CERAMIC	15PF	5%	50V	
C238	1-101-004-00	CERAMIC	0.01MF		50V	
C239	1-101-004-00	CERAMIC	0.01MF		50V	
C301	1-124-122-11	ELECT	100MF	20%	16V	
C302	1-101-004-00	CERAMIC	0.01MF		50V	
C303	1-124-122-11	ELECT	100MF	20%	16V	
C304	1-101-004-00	CERAMIC	0.01MF		50V	
C305	1-102-942-00	CERAMIC	5PF	1PF	50V	
C306	1-124-963-11	ELECT	33MF	20%	16V	
C307	1-136-173-00	FILM	0.47MF	5%	50V	
C308	1-136-173-00	FILM	0.47MF	5%	50V	
C309	1-101-004-00	CERAMIC	0.01MF		50V	
C310	1-123-330-00	ELECT	22MF	20%	25V	
C311	1-123-330-00	ELECT	22MF	20%	25V	
C312	1-123-330-00	ELECT	22MF	20%	25V	
C313	1-123-330-00	ELECT	22MF	20%	25V	
C314	1-124-963-11	ELECT	33MF	20%	16V	
C315	1-101-004-00	CERAMIC	0.01MF		50V	
C316	1-124-963-11	ELECT	33MF	20%	16V	
C317	1-101-004-00	CERAMIC	0.01MF		50V	
C318	1-124-963-11	ELECT	33MF	20%	16V	
C319	1-136-169-00	FILM	0.22MF	5%	50V	
C320	1-101-004-00	CERAMIC	0.01MF		50V	
C321	1-136-165-00	FILM	0.1MF	5%	50V	
C322	1-101-004-00	CERAMIC	0.01MF		50V	
C323	1-102-942-00	CERAMIC	5PF	1PF	50V	
C324	1-123-330-00	ELECT	22MF	20%	25V	
C325	1-123-330-00	ELECT	22MF	20%	25V	
C326	1-136-173-00	FILM	0.47MF	5%	50V	
C327	1-101-004-00	CERAMIC	0.01MF		50V	
C329	1-101-004-00	CERAMIC	0.01MF		50V	
C331	1-101-004-00	CERAMIC	0.01MF		50V	
C332	1-101-004-00	CERAMIC	0.01MF		50V	
C333	1-101-004-00	CERAMIC	0.01MF		50V	
C334	1-102-963-00	CERAMIC	33PF	5%	50V	
C335	1-101-004-00	CERAMIC	0.01MF		50V	
C337	1-102-951-00	CERAMIC	15PF	5%	50V	
C338	1-101-004-00	CERAMIC	0.01MF		50V	
C339	1-101-004-00	CERAMIC	0.01MF		50V	

<DIODE>

D001	8-719-911-19	DIODE 1SS119	
D002	8-719-911-19	DIODE 1SS119	
D007	8-719-153-49	DIODE RD3.9EB1TN	
D101	8-719-110-41	DIODE RD15ESB2	
D102	8-719-911-19	DIODE 1SS119	
D103	8-719-911-19	DIODE 1SS119	
D104	8-719-911-19	DIODE 1SS119	
D106	8-719-911-19	DIODE 1SS119	
D107	8-719-153-60	DIODE RD5.6EB1TN	
D108	8-719-153-60	DIODE RD5.6EB1TN	
D201	8-719-110-41	DIODE RD15ESB2	
D202	8-719-911-19	DIODE 1SS119	
D203	8-719-911-19	DIODE 1SS119	
D204	8-719-911-19	DIODE 1SS119	
D206	8-719-911-19	DIODE 1SS119	
D207	8-719-153-60	DIODE RD5.6EB1TN	
D208	8-719-153-60	DIODE RD5.6EB1TN	
D301	8-719-110-41	DIODE RD15ESB2	
D302	8-719-911-19	DIODE 1SS119	
D303	8-719-911-19	DIODE 1SS119	
D304	8-719-911-19	DIODE 1SS119	
D306	8-719-911-19	DIODE 1SS119	
D307	8-719-153-60	DIODE RD5.6EB1TN	
D308	8-719-153-60	DIODE RD5.6EB1TN	

<IC>

IC001	8-759-400-29	IC AN78L04	
IC002	8-759-982-46	IC RC79L08A	
IC101	8-741-131-30	IC BX-1313	
IC102	8-759-800-81	IC LA7016	
IC103	8-741-131-50	IC BX-1315	
IC104	8-766-001-49	TRANSISTOR TX-429M	
IC105	8-741-131-40	IC BX-1314	
IC106	8-741-131-30	IC BX-1313	
IC107	8-741-131-30	IC BX-1313	
IC201	8-741-131-30	IC BX-1313	
IC202	8-759-800-81	IC LA7016	
IC203	8-741-131-50	IC BX-1315	
IC204	8-766-001-49	TRANSISTOR TX-429M	
IC205	8-741-131-40	IC BX-1314	
IC206	8-741-131-30	IC BX-1313	
IC207	8-741-131-30	IC BX-1313	
IC301	8-741-131-30	IC BX-1313	
IC302	8-759-800-81	IC LA7016	
IC303	8-741-131-50	IC BX-1315	
IC304	8-766-001-49	TRANSISTOR TX-429M	
IC305	8-741-131-40	IC BX-1314	
IC306	8-741-131-30	IC BX-1313	
IC307	8-741-131-30	IC BX-1313	

<COIL>

L102	1-408-421-00	INDUCTOR	100UH
L103	1-408-421-00	INDUCTOR	100UH
L202	1-408-421-00	INDUCTOR	100UH
L203	1-408-421-00	INDUCTOR	100UH
L302	1-408-421-00	INDUCTOR	100UH
L303	1-408-421-00	INDUCTOR	100UH

<TRANSISTOR>

Q101	8-729-105-88	TRANSISTOR 2SC2570A	
Q102	8-729-105-88	TRANSISTOR 2SC2570A	
Q103	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q104	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q105	8-729-105-88	TRANSISTOR 2SC2570A	

Ref. No.	Part No.	Description	Remark
Q106	8-729-802-44	TRANSISTOR 2SK125-4	
Q107	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q108	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q201	8-729-105-88	TRANSISTOR 2SC2570A	
Q202	8-729-105-88	TRANSISTOR 2SC2570A	
Q203	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q204	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q205	8-729-105-88	TRANSISTOR 2SC2570A	
Q206	8-729-802-44	TRANSISTOR 2SK125-4	
Q207	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q208	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q301	8-729-105-88	TRANSISTOR 2SC2570A	
Q302	8-729-105-88	TRANSISTOR 2SC2570A	
Q303	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q304	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q305	8-729-105-88	TRANSISTOR 2SC2570A	
Q306	8-729-802-44	TRANSISTOR 2SK125-4	
Q307	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q308	8-729-119-76	TRANSISTOR 2SA1175-HFE	

<RESISTOR>

R013	1-247-903-00	CARBON	1M	5%	1/4W
R101	1-249-405-11	CARBON	100	5%	1/4W
R102	1-249-433-11	CARBON	22K	5%	1/4W
R103	1-215-413-00	METAL	470	1%	1/6W
R104	1-215-429-00	METAL	2.2K	1%	1/6W
R105	1-215-429-00	METAL	2.2K	1%	1/6W
R106	1-249-405-11	CARBON	100	5%	1/4W
R107	1-215-415-00	METAL	560	1%	1/6W
R108	1-249-405-11	CARBON	100	5%	1/4W
R109	1-215-411-00	METAL	390	1%	1/6W
R110	1-249-405-11	CARBON	100	5%	1/4W
R111	1-215-411-00	METAL	390	1%	1/6W
R112	1-249-405-11	CARBON	100	5%	1/4W
R113	1-249-421-11	CARBON	2.2K	5%	1/4W
R116	1-249-417-11	CARBON	1K	5%	1/4W
R117	1-247-846-11	CARBON	4.3K	5%	1/4W
R118	1-249-435-11	CARBON	33K	5%	1/4W
R122	1-249-405-11	CARBON	100	5%	1/4W
R123	1-249-429-11	CARBON	10K	5%	1/4W
R124	1-247-903-00	CARBON	1M	5%	1/4W
R125	1-249-405-11	CARBON	100	5%	1/4W
R126	1-215-419-00	METAL	820	1%	1/6W
R127	1-215-409-00	METAL	330	1%	1/6W
R128	1-215-429-00	METAL	2.2K	1%	1/6W
R129	1-215-429-00	METAL	2.2K	1%	1/6W
R131	1-215-445-00	METAL	10K	1%	1/6W
R132	1-215-409-00	METAL	330	1%	1/6W
R133	1-215-423-00	METAL	1.2K	1%	1/6W
R134	1-215-445-00	METAL	10K	1%	1/6W
R135	1-215-428-00	METAL	2K	1%	1/6W
R136	1-215-445-00	METAL	10K	1%	1/6W
R138	1-215-449-00	METAL	15K	1%	1/6W
R139	1-215-421-00	METAL	1K	1%	1/6W
R140	1-215-441-00	METAL	6.8K	1%	1/6W
R141	1-214-702-00	METAL	75	1%	1/4W
R142	1-249-399-11	CARBON	33	5%	1/4W
R144	1-249-429-11	CARBON	10K	5%	1/4W
R145	1-249-393-11	CARBON	10	5%	1/4W
R146	1-247-903-00	CARBON	1M	5%	1/4W
R148	1-249-405-11	CARBON	100	5%	1/4W
R149	1-249-441-11	CARBON	100K	5%	1/4W
R201	1-249-405-11	CARBON	100	5%	1/4W
R202	1-249-433-11	CARBON	22K	5%	1/4W
R203	1-215-413-00	METAL	470	1%	1/6W
R204	1-215-429-00	METAL	2.2K	1%	1/6W
R205	1-215-429-00	METAL	2.2K	1%	1/6W
R206	1-249-405-11	CARBON	100	5%	1/4W
R207	1-215-415-00	METAL	560	1%	1/6W
R208	1-249-405-11	CARBON	100	5%	1/4W
R209	1-215-411-00	METAL	390	1%	1/6W
R210	1-249-405-11	CARBON	100	5%	1/4W
R211	1-215-411-00	METAL	390	1%	1/6W
R212	1-249-405-11	CARBON	100	5%	1/4W
R213	1-249-421-11	CARBON	2.2K	5%	1/4W
R216	1-249-417-11	CARBON	1K	5%	1/4W
R217	1-247-846-11	CARBON	4.3K	5%	1/4W
R218	1-249-435-11	CARBON	33K	5%	1/4W
R222	1-249-405-11	CARBON	100	5%	1/4W
R223	1-249-429-11	CARBON	10K	5%	1/4W
R224	1-247-903-00	CARBON	1M	5%	1/4W
R225	1-249-405-11	CARBON	100	5%	1/4W
R226	1-215-419-00	METAL	820	1%	1/6W
R227	1-215-409-00	METAL	330	1%	1/6W
R228	1-215-429-00	METAL	2.2K	1%	1/6W
R229	1-215-429-00	METAL	2.2K	1%	1/6W
R231	1-215-445-00	METAL	10K	1%	1/6W
R232	1-215-409-00	METAL	330	1%	1/6W
R233	1-215-423-00	METAL	1.2K	1%	1/6W
R234	1-215-445-00	METAL	10K	1%	1/6W
R235	1-215-428-00	METAL	2K	1%	1/6W
R236	1-215-445-00	METAL	10K	1%	1/6W
R238	1-215-449-00	METAL	15K	1%	1/6W
R239	1-215-421-00	METAL	1K	1%	1/6W
R240	1-215-441-00	METAL	6.8K	1%	1/6W
R241	1-214-702-00	METAL	75	1%	1/4W
R242	1-249-399-11	CARBON	33	5%	1/4W
R244	1-249-429-11	CARBON	10K	5%	1/4W
R245	1-249-393-11	CARBON	10	5%	1/4W
R246	1-247-903-00	CARBON	1M	5%	1/4W
R248	1-249-405-11	CARBON	100	5%	1/4W
R249	1-249-441-11	CARBON	100K	5%	1/4W
R301	1-249-405-11	CARBON	100	5%	1/4W
R302	1-249-433-11	CARBON	22K	5%	1/4W
R303	1-215-413-00	METAL	470	1%	1/6W
R304	1-215-429-00	METAL	2.2K	1%	1/6W
R305	1-215-429-00	METAL	2.2K	1%	1/6W
R306	1-249-405-11	CARBON	100	5%	1/4W
R307	1-215-415-00	METAL	560	1%	1/6W
R308	1-249-405-11	CARBON	100	5%	1/4W
R309	1-215-411-00	METAL	390	1%	1/6W
R310	1-249-405-11	CARBON	100	5%	1/4W
R311	1-215-411-00	METAL	390	1%	1/6W
R312	1-249-405-11	CARBON	100	5%	1/4W
R313	1-249-421-11	CARBON	2.2K	5%	1/4W
R316	1-249-417-11	CARBON	1K	5%	1/4W
R317	1-247-846-11	CARBON	4.3K	5%	1/4W
R318	1-249-435-11	CARBON	33K	5%	1/4W
R322	1-249-405-11	CARBON	100	5%	1/4W
R323	1-249-429-11	CARBON	10K	5%	1/4W
R324	1-247-903-00	CARBON	1M	5%	1/4W
R325	1-249-405-11	CARBON	100	5%	1/4W

BD P R

Ref. No.	Part No.	Description				Remark
R326	1-215-419-00	METAL	820	1%	1/6W	
R327	1-215-409-00	METAL	330	1%	1/6W	
R328	1-215-429-00	METAL	2.2K	1%	1/6W	
R329	1-215-429-00	METAL	2.2K	1%	1/6W	
R331	1-215-445-00	METAL	10K	1%	1/6W	
R332	1-215-409-00	METAL	330	1%	1/6W	
R333	1-215-423-00	METAL	1.2K	1%	1/6W	
R334	1-215-445-00	METAL	10K	1%	1/6W	
R335	1-215-428-00	METAL	2K	1%	1/6W	
R336	1-215-445-00	METAL	10K	1%	1/6W	
R338	1-215-449-00	METAL	15K	1%	1/6W	
R339	1-215-421-00	METAL	1K	1%	1/6W	
R340	1-215-441-00	METAL	6.8K	1%	1/6W	
R341	1-214-702-00	METAL	75	1%	1/4W	
R342	1-249-399-11	CARBON	33	5%	1/4W	
R344	1-249-429-11	CARBON	10K	5%	1/4W	
R345	1-249-393-11	CARBON	10	5%	1/4W	
R346	1-247-903-00	CARBON	1M	5%	1/4W	
R348	1-249-405-11	CARBON	100	5%	1/4W	
R349	1-249-441-11	CARBON	100K	5%	1/4W	

****

*1-617-480-11 P BOARD
****

<CONNECTOR>

P1 *1-508-768-00 PIN, CONNECTOR (5MM PITCH) 6P

****

*A-1235-012-A R BOARD, COMPLETE
****

<CAPACITOR>

C1	1-101-004-00	CERAMIC	0.01MF		50V
C2	1-101-004-00	CERAMIC	0.01MF		50V
C3	1-101-004-00	CERAMIC	0.01MF		50V
C4	1-102-074-00	CERAMIC	0.001MF	10%	50V
C5	1-102-074-00	CERAMIC	0.001MF	10%	50V
C6	1-101-004-00	CERAMIC	0.01MF		50V
C7	1-101-004-00	CERAMIC	0.01MF		50V
C8	1-102-074-00	CERAMIC	0.001MF	10%	50V
C9	1-102-074-00	CERAMIC	0.001MF	10%	50V
C10	1-102-074-00	CERAMIC	0.001MF	10%	50V
C11	1-102-074-00	CERAMIC	0.001MF	10%	50V
C12	1-102-074-00	CERAMIC	0.001MF	10%	50V
C13	1-102-074-00	CERAMIC	0.001MF	10%	50V
C14	1-123-356-00	ELECT	10MF	20%	16V
C15	1-123-356-00	ELECT	10MF	20%	16V
C16	1-123-356-00	ELECT	10MF	20%	16V
C17	1-123-356-00	ELECT	10MF	20%	16V
C18	1-126-101-11	ELECT	100MF	20%	10V
C19	1-123-332-00	ELECT	47MF	20%	16V
C20	1-123-332-00	ELECT	47MF	20%	16V
C21	1-123-356-00	ELECT	10MF	20%	16V
C22	1-123-356-00	ELECT	10MF	20%	16V
C24	1-136-165-00	FILM	0.1MF	5%	50V
C25	1-136-165-00	FILM	0.1MF	5%	50V
C40	1-123-332-00	ELECT	47MF	20%	16V
C41	1-102-074-00	CERAMIC	0.001MF	10%	50V

Ref. No.	Part No.	Description				Remark
C50	1-126-234-11	ELECT	2200MF	20%	16V	
C51	1-124-360-00	ELECT	1000MF	20%	16V	
C52	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C60	1-126-234-11	ELECT	2200MF	20%	16V	
C61	1-124-360-00	ELECT	1000MF	20%	16V	
C62	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C70	1-136-165-00	FILM	0.1MF	5%	50V	
C71	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C72	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C80	1-123-332-00	ELECT	47MF	20%	16V	
C81	1-123-332-00	ELECT	47MF	20%	16V	
C82	1-123-332-00	ELECT	47MF	20%	16V	
C83	1-123-332-00	ELECT	47MF	20%	16V	
C84	1-123-332-00	ELECT	47MF	20%	16V	
C85	1-123-332-00	ELECT	47MF	20%	16V	
C100	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C101	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C102	1-136-165-00	FILM	0.1MF	5%	50V	
C200	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C201	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C202	1-136-165-00	FILM	0.1MF	5%	50V	
C300	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C301	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C302	1-136-165-00	FILM	0.1MF	5%	50V	
C400	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C401	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C402	1-136-165-00	FILM	0.1MF	5%	50V	
C500	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C501	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C502	1-136-165-00	FILM	0.1MF	5%	50V	
C600	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C601	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C602	1-136-165-00	FILM	0.1MF	5%	50V	
C701	1-101-004-00	CERAMIC	0.01MF		50V	
C702	1-101-004-00	CERAMIC	0.01MF		50V	
C703	1-101-004-00	CERAMIC	0.01MF		50V	
C704	1-101-004-00	CERAMIC	0.01MF		50V	
C705	1-101-004-00	CERAMIC	0.01MF		50V	
C706	1-101-004-00	CERAMIC	0.01MF		50V	
C707	1-101-004-00	CERAMIC	0.01MF		50V	
C708	1-101-004-00	CERAMIC	0.01MF		50V	
C709	1-101-004-00	CERAMIC	0.01MF		50V	
C710	1-101-004-00	CERAMIC	0.01MF		50V	
C711	1-101-004-00	CERAMIC	0.01MF		50V	
C712	1-101-004-00	CERAMIC	0.01MF		50V	
C713	1-101-004-00	CERAMIC	0.01MF		50V	
C714	1-101-004-00	CERAMIC	0.01MF		50V	
C715	1-101-004-00	CERAMIC	0.01MF		50V	
C716	1-101-004-00	CERAMIC	0.01MF		50V	

<DIODE>

D1	8-719-971-20	DIODE ERC38-06
D2	8-719-971-20	DIODE ERC38-06
D3	8-719-911-19	DIODE 1SS119
D4	8-719-911-19	DIODE 1SS119
D5	8-719-110-03	DIODE RD7.5ESB2
D6	8-719-110-03	DIODE RD7.5ESB2
D7	8-719-911-19	DIODE 1SS119
D8	8-719-110-03	DIODE RD7.5ESB2

Ref. No.	Part No.	Description	Remark
		<IC>	
IC1	8-759-232-07	IC TC74HC04AP	
IC2	8-759-202-84	IC MC74HC109N	
IC3	8-759-771-25	IC MB7112E-HDM	
IC4	8-749-900-14	IC CP2005S	
IC5	8-759-145-58	IC RC4558P	
IC6	8-759-145-58	IC RC4558P	
IC7	8-759-145-58	IC RC4558P	
IC8	8-759-982-52	IC RC79M05FA	
IC9	8-759-107-33	IC UPC1060C	
IC10	8-759-990-82	IC TL082CP	
IC11	8-759-145-58	IC RC4558P	
IC12	8-759-145-58	IC RC4558P	
IC13	8-759-145-58	IC RC4558P	
IC14	8-759-145-58	IC RC4558P	
IC15	8-759-145-58	IC RC4558P	
IC16	8-759-145-58	IC RC4558P	
IC17	8-759-145-58	IC RC4558P	
IC18	8-759-145-58	IC RC4558P	
IC19	8-759-040-53	IC TC4053BP	
IC20	8-759-040-53	IC TC4053BP	
IC21	8-759-145-58	IC RC4558P	
IC22	8-759-145-58	IC RC4558P	
IC23	8-759-145-58	IC RC4558P	
		<TRANSISTOR>	
Q1	8-729-313-82	TRANSISTOR 2SD1138-C	
Q2	8-729-386-12	TRANSISTOR 2SB861-C	
Q3	8-729-313-82	TRANSISTOR 2SD1138-C	
Q4	8-729-386-12	TRANSISTOR 2SB861-C	
Q5	8-729-313-82	TRANSISTOR 2SD1138-C	
Q6	8-729-386-12	TRANSISTOR 2SB861-C	
Q7	8-729-313-82	TRANSISTOR 2SD1138-C	
Q8	8-729-386-12	TRANSISTOR 2SB861-C	
Q9	8-729-313-82	TRANSISTOR 2SD1138-C	
Q10	8-729-386-12	TRANSISTOR 2SB861-C	
Q11	8-729-313-82	TRANSISTOR 2SD1138-C	
Q12	8-729-386-12	TRANSISTOR 2SB861-C	
Q13	8-729-900-36	TRANSISTOR DTC124ES	
		<CONNECTOR>	
R1	*1-566-056-11	PIN, CONNECTOR 4P	
R2	*1-566-055-11	PIN, CONNECTOR 3P	
R3	*1-566-054-11	PIN, CONNECTOR 2P	
R4	*1-566-054-11	PIN, CONNECTOR 2P	
R5	*1-566-060-11	PIN, CONNECTOR 8P	
R6	*1-566-058-11	PIN, CONNECTOR 6P	
R7	*1-566-056-11	PIN, CONNECTOR 4P	
R8	*1-566-056-11	PIN, CONNECTOR 4P	
R9	*1-566-056-11	PIN, CONNECTOR 4P	
		<RESISTOR>	
R1	1-215-445-00	METAL 10K 1% 1/6W	
R2	1-215-439-00	METAL 5.6K 1% 1/6W	
R3	1-249-417-11	CARBON 1K 5% 1/4W	
R4	1-249-417-11	CARBON 1K 5% 1/4W	
R5	1-249-417-11	CARBON 1K 5% 1/4W	
R6	1-249-417-11	CARBON 1K 5% 1/4W	
R7	1-249-423-11	CARBON 3.3K 5% 1/4W	
R8	1-249-423-11	CARBON 3.3K 5% 1/4W	
R9	1-215-433-00	METAL 3.3K 1% 1/6W	
R10	1-215-433-00	METAL 3.3K 1% 1/6W	
R11	1-215-439-00	METAL 5.6K 1% 1/6W	
R12	1-215-439-00	METAL 5.6K 1% 1/6W	
R13	1-215-445-00	METAL 10K 1% 1/6W	
R14	1-215-445-00	METAL 10K 1% 1/6W	
R15	1-249-426-11	CARBON 5.6K 5% 1/4W	
R16	1-215-439-00	METAL 5.6K 1% 1/6W	
R17	1-215-439-00	METAL 5.6K 1% 1/6W	
R18	1-215-445-00	METAL 10K 1% 1/6W	
R19	1-215-445-00	METAL 10K 1% 1/6W	
R20	1-249-426-11	CARBON 5.6K 5% 1/4W	
R21	1-215-445-00	METAL 10K 1% 1/6W	
R22	1-215-445-00	METAL 10K 1% 1/6W	
R23	1-215-444-00	METAL 9.1K 1% 1/6W	
R24	1-249-423-11	CARBON 3.3K 5% 1/4W	
R25	1-215-445-00	METAL 10K 1% 1/6W	
R26	1-215-445-00	METAL 10K 1% 1/6W	
R27	1-249-426-11	CARBON 5.6K 5% 1/4W	
R28	1-249-417-11	CARBON 1K 5% 1/4W	
R29	1-249-417-11	CARBON 1K 5% 1/4W	
R30	1-215-405-00	METAL 220 1% 1/6W	
R31	1-249-429-11	CARBON 10K 5% 1/4W	
R32	1-249-429-11	CARBON 10K 5% 1/4W	
R33	1-249-417-11	CARBON 1K 5% 1/4W	
R34	1-249-417-11	CARBON 1K 5% 1/4W	
R35	1-249-429-11	CARBON 10K 5% 1/4W	
R36	1-249-429-11	CARBON 10K 5% 1/4W	
R40	1-215-483-00	METAL 390K 1% 1/6W	
R41	1-249-429-11	CARBON 10K 5% 1/4W	
R42	1-215-469-00	METAL 100K 1% 1/6W	
R43	1-215-437-00	METAL 4.7K 1% 1/6W	
R44	1-215-433-00	METAL 3.3K 1% 1/6W	
R45	1-215-445-00	METAL 10K 1% 1/6W	
R46	1-215-445-00	METAL 10K 1% 1/6W	
R47	1-215-448-00	METAL 13K 1% 1/6W	
R48	1-249-424-11	CARBON 3.9K 5% 1/4W	
R50	1-214-940-11	METAL 1.3M 1% 1/2W	
R51	1-215-473-00	METAL 150K 1% 1/6W	
R52	1-247-895-00	CARBON 470K 5% 1/4W	
R53	1-247-895-00	CARBON 470K 5% 1/4W	
R54	1-215-445-00	METAL 10K 1% 1/6W	
R55	1-215-441-00	METAL 6.8K 1% 1/6W	
R56	1-215-445-00	METAL 10K 1% 1/6W	
R57	1-215-445-00	METAL 10K 1% 1/6W	
R58	1-249-421-11	CARBON 2.2K 5% 1/4W	
R60	1-214-947-00	METAL 2.7M 1% 1/2W	
R61	1-215-493-00	METAL 1M 1% 1/6W	
R62	1-247-895-00	CARBON 470K 5% 1/4W	
R63	1-247-895-00	CARBON 470K 5% 1/4W	
R64	1-215-445-00	METAL 10K 1% 1/6W	
R65	1-215-443-00	METAL 8.2K 1% 1/6W	
R66	1-215-445-00	METAL 10K 1% 1/6W	
R67	1-215-445-00	METAL 10K 1% 1/6W	
R68	1-249-422-11	CARBON 2.7K 5% 1/4W	
R70	1-249-433-11	CARBON 22K 5% 1/4W	
R71	1-215-445-00	METAL 10K 1% 1/6W	
R72	1-249-429-11	CARBON 10K 5% 1/4W	
R73	1-215-469-00	METAL 100K 1% 1/6W	
R74	1-215-437-00	METAL 4.7K 1% 1/6W	
R75	1-215-447-00	METAL 12K 1% 1/6W	

R F

Les composants identifies par une trame et une marque ⚠ sont critiques pour la securite.
Ne les remplacer que par une piece portant le numero specifie.

The components identified by shading and mark ⚠ are critical for safety.
Replace only with part number specified.

Ref. No.	Part No.	Description				Remark
R76	1-215-445-00	METAL	10K	1%	1/6W	
R77	1-215-445-00	METAL	10K	1%	1/6W	
R78	1-215-459-00	METAL	39K	1%	1/6W	
R79	1-249-425-11	CARBON	4.7K	5%	1/4W	
R81	1-215-443-00	METAL	8.2K	1%	1/6W	
R82	1-215-435-00	METAL	3.9K	1%	1/6W	
R83	1-215-443-00	METAL	8.2K	1%	1/6W	
R84	1-215-435-00	METAL	3.9K	1%	1/6W	
R110	1-215-421-00	METAL	1K	1%	1/6W	
R111	1-215-453-00	METAL	22K	1%	1/6W	
R112	1-215-453-00	METAL	22K	1%	1/6W	
R113	1-215-457-00	METAL	33K	1%	1/6W	
R114	1-215-445-00	METAL	10K	1%	1/6W	
R115	1-215-445-00	METAL	10K	1%	1/6W	
R120	1-215-453-00	METAL	22K	1%	1/6W	
R121	1-249-423-11	CARBON	3.3K	5%	1/4W	
R122	1-215-454-00	METAL	24K	1%	1/6W	
R123	1-215-445-00	METAL	10K	1%	1/6W	
R124	1-215-453-00	METAL	22K	1%	1/6W	
R125	1-215-433-00	METAL	3.3K	1%	1/6W	
R126	1-249-422-11	CARBON	2.7K	5%	1/4W	
R127	1-249-382-11	CARBON	1.2	5%	1/4W	F
R128	1-249-382-11	CARBON	1.2	5%	1/4W	F
R129	1-216-355-11	METAL OXIDE	3.3	5%	1W	F
R210	1-215-421-00	METAL	1K	1%	1/6W	
R211	1-215-453-00	METAL	22K	1%	1/6W	
R212	1-215-453-00	METAL	22K	1%	1/6W	
R216	1-215-451-00	METAL	18K	1%	1/6W	
R217	1-215-445-00	METAL	10K	1%	1/6W	
R218	1-215-445-00	METAL	10K	1%	1/6W	
R220	1-215-453-00	METAL	22K	1%	1/6W	
R221	1-249-423-11	CARBON	3.3K	5%	1/4W	
R222	1-215-454-00	METAL	24K	1%	1/6W	
R223	1-215-445-00	METAL	10K	1%	1/6W	
R224	1-215-453-00	METAL	22K	1%	1/6W	
R225	1-215-433-00	METAL	3.3K	1%	1/6W	
R226	1-249-422-11	CARBON	2.7K	5%	1/4W	
R227	1-249-382-11	CARBON	1.2	5%	1/4W	F
R228	1-249-382-11	CARBON	1.2	5%	1/4W	F
R229	1-216-355-11	METAL OXIDE	3.3	5%	1W	F
R310	1-215-421-00	METAL	1K	1%	1/6W	
R311	1-215-453-00	METAL	22K	1%	1/6W	
R320	1-215-453-00	METAL	22K	1%	1/6W	
R321	1-249-426-11	CARBON	5.6K	5%	1/4W	
R322	1-215-454-00	METAL	24K	1%	1/6W	
R323	1-215-445-00	METAL	10K	1%	1/6W	
R324	1-215-453-00	METAL	22K	1%	1/6W	
R325	1-215-441-00	METAL	6.8K	1%	1/6W	
R326	1-249-426-11	CARBON	5.6K	5%	1/4W	
R327	1-249-382-11	CARBON	1.2	5%	1/4W	F
R328	1-249-382-11	CARBON	1.2	5%	1/4W	F
R329	1-216-355-11	METAL OXIDE	3.3	5%	1W	F
R410	1-215-421-00	METAL	1K	1%	1/6W	
R411	1-215-453-00	METAL	22K	1%	1/6W	
R420	1-215-453-00	METAL	22K	1%	1/6W	
R421	1-249-426-11	CARBON	5.6K	5%	1/4W	
R422	1-215-454-00	METAL	24K	1%	1/6W	
R423	1-215-445-00	METAL	10K	1%	1/6W	
R424	1-215-453-00	METAL	22K	1%	1/6W	
R425	1-215-441-00	METAL	6.8K	1%	1/6W	
R426	1-249-426-11	CARBON	5.6K	5%	1/4W	
R427	1-249-382-11	CARBON	1.2	5%	1/4W	F
R428	1-249-382-11	CARBON	1.2	5%	1/4W	F
R429	1-216-355-11	METAL OXIDE	3.3	5%	1W	F
R510	1-215-421-00	METAL	1K	1%	1/6W	
R511	1-215-453-00	METAL	22K	1%	1/6W	
R512	1-215-453-00	METAL	22K	1%	1/6W	
R513	1-215-453-00	METAL	22K	1%	1/6W	
R514	1-215-445-00	METAL	10K	1%	1/6W	
R515	1-215-445-00	METAL	10K	1%	1/6W	
R520	1-215-453-00	METAL	22K	1%	1/6W	
R521	1-249-423-11	CARBON	3.3K	5%	1/4W	
R522	1-215-454-00	METAL	24K	1%	1/6W	
R523	1-215-445-00	METAL	10K	1%	1/6W	
R524	1-215-453-00	METAL	22K	1%	1/6W	
R525	1-215-433-00	METAL	3.3K	1%	1/6W	
R526	1-249-422-11	CARBON	2.7K	5%	1/4W	
R527	1-249-382-11	CARBON	1.2	5%	1/4W	F
R528	1-249-382-11	CARBON	1.2	5%	1/4W	F
R529	1-216-355-11	METAL OXIDE	3.3	5%	1W	F
R610	1-215-421-00	METAL	1K	1%	1/6W	
R611	1-215-453-00	METAL	22K	1%	1/6W	
R612	1-215-453-00	METAL	22K	1%	1/6W	
R616	1-215-453-00	METAL	22K	1%	1/6W	
R617	1-215-445-00	METAL	10K	1%	1/6W	
R618	1-215-445-00	METAL	10K	1%	1/6W	
R620	1-215-453-00	METAL	22K	1%	1/6W	
R621	1-249-423-11	CARBON	3.3K	5%	1/4W	
R622	1-215-454-00	METAL	24K	1%	1/6W	
R623	1-215-445-00	METAL	10K	1%	1/6W	
R624	1-215-453-00	METAL	22K	1%	1/6W	
R625	1-215-433-00	METAL	3.3K	1%	1/6W	
R626	1-249-422-11	CARBON	2.7K	5%	1/4W	
R627	1-249-382-11	CARBON	1.2	5%	1/4W	F
R628	1-249-382-11	CARBON	1.2	5%	1/4W	F
R629	1-216-355-11	METAL OXIDE	3.3	5%	1W	F

<COMPOSITION CIRCUIT BLOCK>

RB2	1-249-429-11	COMPOSITION CIRCUIT BLOCK

<VARIABLE RESISTOR>

RV1	1-237-516-21	RES, ADJ, CERMET 2K
RV2	1-237-517-21	RES, ADJ, CERMET 5K
RV3	1-237-517-21	RES, ADJ, CERMET 5K
RV4	1-237-518-21	RES, ADJ, CERMET 10K
RV5	1-237-518-21	RES, ADJ, CERMET 10K
RV6	1-237-516-21	RES, ADJ, CERMET 2K

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*1-619-844-11 F BOARD
****

<CAPACITOR>

C1	⚠1-130-712-11	FILM	0.47MF	20%	250V
C2	⚠1-161-742-51	CERAMIC	0.0022MF	20%	400V
C3	⚠1-161-742-51	CERAMIC	0.0022MF	20%	400V
C4	⚠1-161-742-51	CERAMIC	0.0022MF	20%	400V
C5	⚠1-161-742-51	CERAMIC	0.0022MF	20%	400V
C6	⚠1-130-711-11	FILM	0.22MF	20%	250V
C7	⚠1-161-953-51	CERAMIC	0.0047MF	20%	400V

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F QC

Ref. No.	Part No.	Description				Remark
C8	⚠1-161-953-51	CERAMIC	0.0047MF	20%	400V	
C9	⚠1-161-953-51	CERAMIC	0.0047MF	20%	400V	
C10	⚠1-161-953-51	CERAMIC	0.0047MF	20%	400V	
C11	1-125-538-11	ELECT(BLOCK)	1000MF	20%	200V	
C12	1-125-538-11	ELECT(BLOCK)	1000MF	20%	200V	
C13	1-106-371-00	MYLAR	0.015MF	10%	200V	
C14	1-123-379-00	ELECT	0.47MF	20%	50V	
		<DIODE>				
D1	8-719-003-08	THYRISTOR CR3CM-8				
D2	⚠8-719-300-07	DIODE RB406N				
		<CONNECTOR>				
F1	*1-508-784-00	PIN, CONNECTOR (5MM PITCH) 1P				
F2	1-506-348-99	PIN, CONNECTOR 3P				
F3	*1-506-371-00	PIN, CONNECTOR 2P				
F4	*1-508-765-00	PIN, CONNECTOR (5MM PITCH) 3P				
F5	*1-508-765-00	PIN, CONNECTOR (5MM PITCH) 3P				
F6	*1-508-767-00	PIN, CONNECTOR (5MM PITCH) 5P				
F7	*1-566-054-11	PIN, CONNECTOR 2P				
F8	1-506-348-99	PIN, CONNECTOR 3P				
F9	1-506-348-99	PIN, CONNECTOR 3P				
F10	*1-508-765-00	PIN, CONNECTOR (5MM PITCH) 3P				
F12	*1-508-767-00	PIN, CONNECTOR (5MM PITCH) 5P				
		<NEON LAMP>				
NL1	1-519-331-11	LAMP, NEON 3P				
		<RESISTOR>				
R1	⚠1-202-730-91	SOLID	8.2M	10%	1/2W	
R2	⚠1-202-845-91	SOLID	390K	10%	1/2W	
R3	⚠1-217-295-11	WIREWOUND	5.6	10%	5W	F
R4	1-249-465-11	CARBON	47K	5%	1/4W	
R5	1-249-492-11	CARBON	47K	5%	1/2W	
R6	1-249-465-11	CARBON	47K	5%	1/4W	
R7	1-217-337-00	WIREWOUND	22	10%	7W	F
R8	1-247-717-11	CARBON	2.2K	5%	1/4W	
R9	1-247-713-11	CARBON	1K	5%	1/4W	
R10	1-217-337-00	WIREWOUND	22	10%	7W	F
		<RELAY>				
RY1	⚠1-515-491-11	RELAY (POWER)				
		<TRANSFORMER>				
T1	⚠1-421-590-11	TRANSFORMER, LINE FILTER				
T2	⚠1-421-590-11	TRANSFORMER, LINE FILTER				
		<THERMISTOR>				
TH1	⚠1-800-416-11	THERMISTOR				
TH2	⚠1-800-416-11	THERMISTOR				
THP1	⚠1-800-686-33	THERMISTOR (POSITIVE)				
THP2	⚠1-806-387-12	THERMISTOR (POSITIVE)				

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Ref. No.	Part No.	Description				Remark
	*A-1275-069-A	QC BOARD, COMPLETE				
		**********				
	1-536-992-11	TERMINAL BOARD, INPUT/OUTPUT (SYNC)				
		<CAPACITOR>				
C101	1-161-021-11	CERAMIC	0.047MF	10%	25V	
C102	1-124-631-11	ELECT	47MF	20%	16V	
C103	1-101-004-00	CERAMIC	0.01MF		50V	
C104	1-123-332-00	ELECT	47MF	20%	16V	
C106	1-102-934-00	CERAMIC	1PF	0.25PF	50V	
C107	1-102-934-00	CERAMIC	1PF	0.25PF	50V	
C108	1-124-631-11	ELECT	47MF	20%	16V	
C109	1-101-004-00	CERAMIC	0.01MF		50V	
C110	1-161-021-11	CERAMIC	0.047MF	10%	25V	
C111	1-124-631-11	ELECT	47MF	20%	16V	
C112	1-101-004-00	CERAMIC	0.01MF		50V	
C113	1-161-021-11	CERAMIC	0.047MF	10%	25V	
C130	1-101-004-00	CERAMIC	0.01MF		50V	
C131	1-124-963-11	ELECT	33MF	20%	16V	
C132	1-101-004-00	CERAMIC	0.01MF		50V	
C133	1-124-963-11	ELECT	33MF	20%	16V	
C134	1-101-004-00	CERAMIC	0.01MF		50V	
C135	1-124-963-11	ELECT	33MF	20%	16V	
C136	1-101-004-00	CERAMIC	0.01MF		50V	
C137	1-124-963-11	ELECT	33MF	20%	16V	
C138	1-101-004-00	CERAMIC	0.01MF		50V	
C139	1-124-963-11	ELECT	33MF	20%	16V	
C140	1-101-004-00	CERAMIC	0.01MF		50V	
C141	1-124-963-11	ELECT	33MF	20%	16V	
C142	1-101-004-00	CERAMIC	0.01MF		50V	
C143	1-101-004-00	CERAMIC	0.01MF		50V	
C144	1-101-004-00	CERAMIC	0.01MF		50V	
C145	1-101-004-00	CERAMIC	0.01MF		50V	
C146	1-101-004-00	CERAMIC	0.01MF		50V	
		<TRIMMER>				
CV101	1-141-179-12	CAP, TRIMMER				
		<TRANSISTOR>				
Q101	8-729-105-88	TRANSISTOR 2SC2570A				
Q102	8-729-105-88	TRANSISTOR 2SC2570A				
Q103	8-729-103-19	TRANSISTOR 2SA1206-K1				
Q104	8-729-105-88	TRANSISTOR 2SC2570A				
Q105	8-729-105-88	TRANSISTOR 2SC2570A				
Q106	8-729-119-78	TRANSISTOR 2SC2785-HFE				
Q107	8-729-119-78	TRANSISTOR 2SC2785-HFE				
Q108	8-729-119-78	TRANSISTOR 2SC2785-HFE				
Q109	8-729-119-78	TRANSISTOR 2SC2785-HFE				
		<CONNECTOR>				
QC1	*1-564-465-11	CONNECTOR (LIGHT ANGLE) 22P				
QC2	*1-566-058-11	PIN, CONNECTOR 6P				
		<RESISTOR>				
R101	1-249-417-11	CARBON	1K	5%	1/4W	
R102	1-249-417-11	CARBON	1K	5%	1/4W	
R103	1-215-440-00	METAL	6.2K	1%	1/6W	

QC QD QA

Ref. No.	Part No.	Description				Remark
R104	1-215-447-00	METAL	12K	1%	1/6W	
R105	1-215-445-00	METAL	10K	1%	1/6W	
R106	1-215-448-00	METAL	13K	1%	1/6W	
R107	1-215-429-00	METAL	2.2K	1%	1/6W	
R108	1-215-421-00	METAL	1K	1%	1/6W	
R109	1-215-437-00	METAL	4.7K	1%	1/6W	
R110	1-215-397-00	METAL	100	1%	1/6W	
R111	1-249-405-11	CARBON	100	5%	1/4W	
R112	1-249-420-11	CARBON	1.8K	5%	1/4W	
R113	1-215-421-00	METAL	1K	1%	1/6W	
R114	1-214-702-00	METAL	75	1%	1/4W	
R115	1-249-417-11	CARBON	1K	5%	1/4W	
R116	1-249-405-11	CARBON	100	5%	1/4W	
R117	1-249-431-11	CARBON	15K	5%	1/4W	
R118	1-249-427-11	CARBON	6.8K	5%	1/4W	
R119	1-249-439-11	CARBON	68K	5%	1/4W	
R121	1-249-425-11	CARBON	4.7K	5%	1/4W	
R122	1-214-702-00	METAL	75	1%	1/4W	
R123	1-249-417-11	CARBON	1K	5%	1/4W	
R124	1-249-405-11	CARBON	100	5%	1/4W	
R125	1-249-427-11	CARBON	6.8K	5%	1/4W	
R126	1-249-431-11	CARBON	15K	5%	1/4W	
R127	1-249-439-11	CARBON	68K	5%	1/4W	
R128	1-249-405-11	CARBON	100	5%	1/4W	
R129	1-249-425-11	CARBON	4.7K	5%	1/4W	
R131	1-247-104-00	CARBON	75	5%	1/4W	
R132	1-247-104-00	CARBON	75	5%	1/4W	
R133	1-247-804-11	CARBON	75	5%	1/4W	
R134	1-249-421-11	CARBON	2.2K	5%	1/4W	
R135	1-249-421-11	CARBON	2.2K	5%	1/4W	
R136	1-249-421-11	CARBON	2.2K	5%	1/4W	
R137	1-249-421-11	CARBON	2.2K	5%	1/4W	
R138	1-249-421-11	CARBON	2.2K	5%	1/4W	
R140	1-249-405-11	CARBON	100	5%	1/4W	

<VARIABLE RESISTOR>

RV101 1-237-516-21 RES, ADJ, CERMET 2K

****

*1-617-479-11 QD BOARD
****

<CONNECTOR>

QD2 1-563-265-11 CONNECTOR, MULTI 10P

****

*A-1275-089-A QA BOARD, COMPLETE
****

1-537-174-11 TERMINAL BOARD, INPUT/OUTPUT

<CAPACITOR>

C101	1-161-021-11	CERAMIC	0.047MF	10%	25V
C102	1-124-631-11	ELECT	47MF	20%	16V
C103	1-101-004-00	CERAMIC	0.01MF		50V
C104	1-123-332-00	ELECT	47MF	20%	16V
C105	1-102-934-00	CERAMIC	1PF	0.25PF	50V
C106	1-102-934-00	CERAMIC	1PF	0.25PF	50V
C107	1-161-021-11	CERAMIC	0.047MF	10%	25V
C108	1-124-631-11	ELECT	47MF	20%	16V
C109	1-101-004-00	CERAMIC	0.01MF		50V
C110	1-123-332-00	ELECT	47MF	20%	16V
C111	1-102-934-00	CERAMIC	1PF	0.25PF	50V
C112	1-102-934-00	CERAMIC	1PF	0.25PF	50V
C113	1-161-021-11	CERAMIC	0.047MF	10%	25V
C114	1-124-631-11	ELECT	47MF	20%	16V
C115	1-101-004-00	CERAMIC	0.01MF		50V
C116	1-123-332-00	ELECT	47MF	20%	16V
C117	1-102-934-00	CERAMIC	1PF	0.25PF	50V
C118	1-102-934-00	CERAMIC	1PF	0.25PF	50V
C128	1-124-963-11	ELECT	33MF	20%	16V
C129	1-101-004-00	CERAMIC	0.01MF		50V
C130	1-101-004-00	CERAMIC	0.01MF		50V
C131	1-124-963-11	ELECT	33MF	20%	16V
C132	1-124-963-11	ELECT	33MF	20%	16V
C133	1-101-004-00	CERAMIC	0.01MF		50V
C134	1-101-004-00	CERAMIC	0.01MF		50V
C135	1-124-963-11	ELECT	33MF	20%	16V
C136	1-124-963-11	ELECT	33MF	20%	16V
C137	1-101-004-00	CERAMIC	0.01MF		50V
C138	1-101-004-00	CERAMIC	0.01MF		50V
C139	1-124-963-11	ELECT	33MF	20%	16V

<TRIMMER>

CV101	1-141-179-12	CAP, TRIMMER
CV102	1-141-179-12	CAP, TRIMMER
CV103	1-141-179-12	CAP, TRIMMER

<TRANSISTOR>

Q101	8-729-105-88	TRANSISTOR 2SC2570A
Q102	8-729-105-88	TRANSISTOR 2SC2570A
Q103	8-729-103-19	TRANSISTOR 2SA1206-K1
Q104	8-729-105-88	TRANSISTOR 2SC2570A
Q105	8-729-105-88	TRANSISTOR 2SC2570A
Q106	8-729-105-88	TRANSISTOR 2SC2570A
Q107	8-729-105-88	TRANSISTOR 2SC2570A
Q108	8-729-103-19	TRANSISTOR 2SA1206-K1
Q109	8-729-105-88	TRANSISTOR 2SC2570A
Q110	8-729-105-88	TRANSISTOR 2SC2570A
Q111	8-729-105-88	TRANSISTOR 2SC2570A
Q112	8-729-105-88	TRANSISTOR 2SC2570A
Q113	8-729-103-19	TRANSISTOR 2SA1206-K1
Q114	8-729-105-88	TRANSISTOR 2SC2570A
Q115	8-729-105-88	TRANSISTOR 2SC2570A

<CONNECTOR>

QA1 *1-564-464-11 CONNECTOR (LIGHT ANGLE) 15P

<RESISTOR>

R101	1-249-417-11	CARBON	1K	5%	1/4W
R102	1-249-417-11	CARBON	1K	5%	1/4W
R103	1-215-440-00	METAL	6.2K	1%	1/6W
R104	1-215-447-00	METAL	12K	1%	1/6W
R105	1-215-445-00	METAL	10K	1%	1/6W
R106	1-215-448-00	METAL	13K	1%	1/6W
R107	1-215-429-00	METAL	2.2K	1%	1/6W
R108	1-215-421-00	METAL	1K	1%	1/6W

Ref. No.	Part No.	Description				Remark
R109	1-215-437-00	METAL	4.7K	1%	1/6W	
R110	1-249-405-11	CARBON	100	5%	1/4W	
R111	1-215-397-00	METAL	100	1%	1/6W	
R112	1-249-420-11	CARBON	1.8K	5%	1/4W	
R113	1-215-421-00	METAL	1K	1%	1/6W	
R114	1-249-417-11	CARBON	1K	5%	1/4W	
R115	1-249-417-11	CARBON	1K	5%	1/4W	
R116	1-215-440-00	METAL	6.2K	1%	1/6W	
R117	1-215-447-00	METAL	12K	1%	1/6W	
R118	1-215-445-00	METAL	10K	1%	1/6W	
R119	1-215-448-00	METAL	13K	1%	1/6W	
R120	1-215-429-00	METAL	2.2K	1%	1/6W	
R121	1-215-421-00	METAL	1K	1%	1/6W	
R122	1-215-437-00	METAL	4.7K	1%	1/6W	
R123	1-249-405-11	CARBON	100	5%	1/4W	
R124	1-215-397-00	METAL	100	1%	1/6W	
R125	1-249-420-11	CARBON	1.8K	5%	1/4W	
R126	1-215-421-00	METAL	1K	1%	1/6W	
R127	1-249-417-11	CARBON	1K	5%	1/4W	
R128	1-249-417-11	CARBON	1K	5%	1/4W	
R129	1-215-440-00	METAL	6.2K	1%	1/6W	
R130	1-215-447-00	METAL	12K	1%	1/6W	
R131	1-215-445-00	METAL	10K	1%	1/6W	
R132	1-215-448-00	METAL	13K	1%	1/6W	
R133	1-215-429-00	METAL	2.2K	1%	1/6W	
R134	1-215-421-00	METAL	1K	1%	1/6W	
R135	1-215-437-00	METAL	4.7K	1%	1/6W	
R136	1-249-405-11	CARBON	100	5%	1/4W	
R137	1-215-397-00	METAL	100	1%	1/6W	
R138	1-249-420-11	CARBON	1.8K	5%	1/4W	
R139	1-215-421-00	METAL	1K	1%	1/6W	
R140	1-249-405-11	CARBON	100	5%	1/4W	
R141	1-249-405-11	CARBON	100	5%	1/4W	
R142	1-249-405-11	CARBON	100	5%	1/4W	
R143	1-249-405-11	CARBON	100	5%	1/4W	
R144	1-249-405-11	CARBON	100	5%	1/4W	
R145	1-249-405-11	CARBON	100	5%	1/4W	
R146	1-247-804-11	CARBON	75	5%	1/4W	
R147	1-247-804-11	CARBON	75	5%	1/4W	
R148	1-247-804-11	CARBON	75	5%	1/4W	

<VARIABLE RESISTOR>

RV101	1-237-516-21	RES, ADJ, CERMET 2K	
RV102	1-237-516-21	RES, ADJ, CERMET 2K	
RV103	1-237-516-21	RES, ADJ, CERMET 2K	

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*A-1275-090-A QB BOARD, COMPLETE
****

1-537-174-21 TERMINAL BOARD, INPUT/OUTPUT

<CAPACITOR>

C101	1-161-021-11	CERAMIC	0.047MF	10%	25V
C102	1-124-631-11	ELECT	47MF	20%	16V
C103	1-101-004-00	CERAMIC	0.01MF		50V
C104	1-123-332-00	ELECT	47MF	20%	16V
C105	1-102-934-00	CERAMIC	1PF	0.25PF	50V
C106	1-102-934-00	CERAMIC	1PF	0.25PF	50V
C107	1-161-021-11	CERAMIC	0.047MF	10%	25V
C108	1-124-631-11	ELECT	47MF	20%	16V
C109	1-101-004-00	CERAMIC	0.01MF		50V
C110	1-123-332-00	ELECT	47MF	20%	16V
C111	1-102-934-00	CERAMIC	1PF	0.25PF	50V
C112	1-102-934-00	CERAMIC	1PF	0.25PF	50V
C113	1-161-021-11	CERAMIC	0.047MF	10%	25V
C114	1-124-631-11	ELECT	47MF	20%	16V
C115	1-101-004-00	CERAMIC	0.01MF		50V
C116	1-123-332-00	ELECT	47MF	20%	16V
C117	1-102-934-00	CERAMIC	1PF	0.25PF	50V
C118	1-102-934-00	CERAMIC	1PF	0.25PF	50V
C128	1-124-963-11	ELECT	33MF	20%	16V
C129	1-101-004-00	CERAMIC	0.01MF		50V
C130	1-101-004-00	CERAMIC	0.01MF		50V
C131	1-124-963-11	ELECT	33MF	20%	16V
C132	1-124-963-11	ELECT	33MF	20%	16V
C133	1-101-004-00	CERAMIC	0.01MF		50V
C134	1-101-004-00	CERAMIC	0.01MF		50V
C135	1-124-963-11	ELECT	33MF	20%	16V
C136	1-124-963-11	ELECT	33MF	20%	16V
C137	1-101-004-00	CERAMIC	0.01MF		50V
C138	1-101-004-00	CERAMIC	0.01MF		50V
C139	1-124-963-11	ELECT	33MF	20%	16V

<TRIMMER>

CV101	1-141-179-12	CAP, TRIMMER
CV102	1-141-179-12	CAP, TRIMMER
CV103	1-141-179-12	CAP, TRIMMER

<TRANSISTOR>

Q101	8-729-105-88	TRANSISTOR 2SC2570A
Q102	8-729-105-88	TRANSISTOR 2SC2570A
Q103	8-729-103-19	TRANSISTOR 2SA1206-K1
Q104	8-729-105-88	TRANSISTOR 2SC2570A
Q105	8-729-105-88	TRANSISTOR 2SC2570A
Q106	8-729-105-88	TRANSISTOR 2SC2570A
Q107	8-729-105-88	TRANSISTOR 2SC2570A
Q108	8-729-103-19	TRANSISTOR 2SA1206-K1
Q109	8-729-105-88	TRANSISTOR 2SC2570A
Q110	8-729-105-88	TRANSISTOR 2SC2570A
Q111	8-729-105-88	TRANSISTOR 2SC2570A
Q112	8-729-105-88	TRANSISTOR 2SC2570A
Q113	8-729-103-19	TRANSISTOR 2SA1206-K1
Q114	8-729-105-88	TRANSISTOR 2SC2570A
Q115	8-729-105-88	TRANSISTOR 2SC2570A

<CONNECTOR>

QB1	*1-564-464-11	CONNECTOR (LIGHT ANGLE) 15P

<RESISTOR>

R101	1-249-417-11	CARBON	1K	5%	1/4W
R102	1-249-417-11	CARBON	1K	5%	1/4W
R103	1-215-440-00	METAL	6.2K	1%	1/6W
R104	1-215-447-00	METAL	12K	1%	1/6W
R105	1-215-445-00	METAL	10K	1%	1/6W
R106	1-215-448-00	METAL	13K	1%	1/6W
R107	1-215-429-00	METAL	2.2K	1%	1/6W
R108	1-215-421-00	METAL	1K	1%	1/6W
R109	1-215-437-00	METAL	4.7K	1%	1/6W

QB BN BC

Ref. No.	Part No.	Description				Remark
R110	1-249-405-11	CARBON	100	5%	1/4W	
R111	1-215-397-00	METAL	100	1%	1/6W	
R112	1-249-420-11	CARBON	1.8K	5%	1/4W	
R113	1-215-421-00	METAL	1K	1%	1/6W	
R114	1-249-417-11	CARBON	1K	5%	1/4W	
R115	1-249-417-11	CARBON	1K	5%	1/4W	
R116	1-215-440-00	METAL	6.2K	1%	1/6W	
R117	1-215-447-00	METAL	12K	1%	1/6W	
R118	1-215-445-00	METAL	10K	1%	1/6W	
R119	1-215-448-00	METAL	13K	1%	1/6W	
R120	1-215-429-00	METAL	2.2K	1%	1/6W	
R121	1-215-421-00	METAL	1K	1%	1/6W	
R122	1-215-437-00	METAL	4.7K	1%	1/6W	
R123	1-249-405-11	CARBON	100	5%	1/4W	
R124	1-215-397-00	METAL	100	1%	1/6W	
R125	1-249-420-11	CARBON	1.8K	5%	1/4W	
R126	1-215-421-00	METAL	1K	1%	1/6W	
R127	1-249-417-11	CARBON	1K	5%	1/4W	
R128	1-249-417-11	CARBON	1K	5%	1/4W	
R129	1-215-440-00	METAL	6.2K	1%	1/6W	
R130	1-215-447-00	METAL	12K	1%	1/6W	
R131	1-215-445-00	METAL	10K	1%	1/6W	
R132	1-215-448-00	METAL	13K	1%	1/6W	
R133	1-215-429-00	METAL	2.2K	1%	1/6W	
R134	1-215-421-00	METAL	1K	1%	1/6W	
R135	1-215-437-00	METAL	4.7K	1%	1/6W	
R136	1-249-405-11	CARBON	100	5%	1/4W	
R137	1-215-397-00	METAL	100	1%	1/6W	
R138	1-249-420-11	CARBON	1.8K	5%	1/4W	
R139	1-215-421-00	METAL	1K	1%	1/6W	
R140	1-249-405-11	CARBON	100	5%	1/4W	
R141	1-249-405-11	CARBON	100	5%	1/4W	
R142	1-249-405-11	CARBON	100	5%	1/4W	
R143	1-249-405-11	CARBON	100	5%	1/4W	
R144	1-249-405-11	CARBON	100	5%	1/4W	
R145	1-249-405-11	CARBON	100	5%	1/4W	
R146	1-247-804-11	CARBON	75	5%	1/4W	
R147	1-247-804-11	CARBON	75	5%	1/4W	
R148	1-247-804-11	CARBON	75	5%	1/4W	

<VARIABLE RESISTOR>

RV101	1-237-516-21	RES, ADJ, CERMET 2K
RV102	1-237-516-21	RES, ADJ, CERMET 2K
RV103	1-237-516-21	RES, ADJ, CERMET 2K

****

*1-626-497-11 BN BOARD
****

4-378-915-01 NUT (M2.6), PLATE

<CONNECTOR>

BN1	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR 64P
BN2	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR 64P
BN3	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR 64P
BN4	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR 64P
BN5	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR 64P
BN6	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR 64P
BN7	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR 64P
BN8	*1-566-045-11	PIN, CONNECTOR 6P
BN9	*1-566-046-11	PIN, CONNECTOR 7P
BN10	*1-566-047-11	PIN, CONNECTOR 8P
BN11	*1-566-054-11	PIN, CONNECTOR 2P
BN12	*1-566-057-11	PIN, CONNECTOR 5P
BN13	*1-566-060-11	PIN, CONNECTOR 8P
BN14	*1-566-056-11	PIN, CONNECTOR 4P
BN15	*1-566-058-11	PIN, CONNECTOR 6P
BN16	*1-566-062-11	PIN, CONNECTOR 10P
BN17	*1-566-054-11	PIN, CONNECTOR 2P
BN18	*1-566-055-11	PIN, CONNECTOR 3P
BN19	*1-566-047-11	PIN, CONNECTOR 8P
BN20	*1-566-047-11	PIN, CONNECTOR 8P
BN21	*1-566-058-11	PIN, CONNECTOR 6P
BN22	*1-566-054-11	PIN, CONNECTOR 2P
BN23	*1-566-055-11	PIN, CONNECTOR 3P
BN24	*1-566-056-11	PIN, CONNECTOR 4P
BN25	*1-566-054-11	PIN, CONNECTOR 2P

<JACK>

BNJ1	1-507-751-00	JACK, PIN 1P
BNJ2	1-507-751-00	JACK, PIN 1P
BNJ3	1-507-751-00	JACK, PIN 1P

****

*A-1296-194-A BC BOARD, COMPLETE
****

*4-353-708-00 HOOK, FINGER
4-378-915-01 NUT (M2.6), PLATE (N1, N2)

<CONNECTOR>

BC1	*1-562-729-11	CONNECTOR, MULTI 64P

<CAPACITOR>

C1	1-101-004-00	CERAMIC	0.01MF		50V
C2	1-101-004-00	CERAMIC	0.01MF		50V
C3	1-101-004-00	CERAMIC	0.01MF		50V
C4	1-101-004-00	CERAMIC	0.01MF		50V
C5	1-124-477-11	ELECT	47MF	20%	25V
C6	1-124-477-11	ELECT	47MF	20%	25V
C7	1-126-103-11	ELECT	470MF	20%	16V
C8	1-126-103-11	ELECT	470MF	20%	16V
C9	1-124-477-11	ELECT	47MF	20%	25V
C10	1-124-477-11	ELECT	47MF	20%	25V
C11	1-124-477-11	ELECT	47MF	20%	25V
C12	1-124-477-11	ELECT	47MF	20%	25V
C13	1-101-004-00	CERAMIC	0.01MF		50V
C14	1-101-004-00	CERAMIC	0.01MF		50V
C15	1-124-478-11	ELECT	100MF	20%	25V
C16	1-124-478-11	ELECT	100MF	20%	25V
C17	1-124-478-11	ELECT	100MF	20%	25V
C18	1-124-478-11	ELECT	100MF	20%	25V
C19	1-101-004-00	CERAMIC	0.01MF		50V
C20	1-101-004-00	CERAMIC	0.01MF		50V
C101	1-102-973-00	CERAMIC	100PF	5%	50V
C102	1-102-973-00	CERAMIC	100PF	5%	50V
C103	1-102-959-00	CERAMIC	22PF	10%	50V
C104	1-101-004-00	CERAMIC	0.01MF		50V
C105	1-101-004-00	CERAMIC	0.01MF		50V

Ref. No.	Part No.	Description				Remark
C106	1-124-477-11	ELECT	47MF	20%	25V	
C107	1-101-004-00	CERAMIC	0.01MF		50V	
C108	1-101-004-00	CERAMIC	0.01MF		50V	
C109	1-102-973-00	CERAMIC	100PF	5%	50V	
C110	1-124-478-11	ELECT	100MF	20%	25V	
C111	1-101-004-00	CERAMIC	0.01MF		50V	
C112	1-124-477-11	ELECT	47MF	20%	25V	
C113	1-124-477-11	ELECT	47MF	20%	25V	
C114	1-102-816-00	CERAMIC	120PF	5%	50V	
C115	1-101-004-00	CERAMIC	0.01MF		50V	
C116	1-101-004-00	CERAMIC	0.01MF		50V	
C117	1-124-477-11	ELECT	47MF	20%	25V	
C119	1-102-953-00	CERAMIC	18PF	5%	50V	
C120	1-124-478-11	ELECT	100MF	20%	25V	
C121	1-101-004-00	CERAMIC	0.01MF		50V	
C122	1-124-477-11	ELECT	47MF	20%	25V	
C123	1-124-477-11	ELECT	47MF	20%	25V	
C125	1-101-004-00	CERAMIC	0.01MF		50V	
C126	1-101-004-00	CERAMIC	0.01MF		50V	
C127	1-124-478-11	ELECT	100MF	20%	25V	
C128	1-124-478-11	ELECT	100MF	20%	25V	
C201	1-102-973-00	CERAMIC	100PF	5%	50V	
C202	1-102-973-00	CERAMIC	100PF	5%	50V	
C203	1-102-959-00	CERAMIC	22PF	10%	50V	
C204	1-101-004-00	CERAMIC	0.01MF		50V	
C205	1-101-004-00	CERAMIC	0.01MF		50V	
C206	1-124-477-11	ELECT	47MF	20%	25V	
C207	1-101-004-00	CERAMIC	0.01MF		50V	
C208	1-101-004-00	CERAMIC	0.01MF		50V	
C209	1-102-973-00	CERAMIC	100PF	5%	50V	
C210	1-124-478-11	ELECT	100MF	20%	25V	
C211	1-101-004-00	CERAMIC	0.01MF		50V	
C212	1-124-477-11	ELECT	47MF	20%	25V	
C213	1-124-477-11	ELECT	47MF	20%	25V	
C214	1-102-816-00	CERAMIC	120PF	5%	50V	
C215	1-101-004-00	CERAMIC	0.01MF		50V	
C216	1-101-004-00	CERAMIC	0.01MF		50V	
C217	1-124-477-11	ELECT	47MF	20%	25V	
C219	1-102-953-00	CERAMIC	18PF	5%	50V	
C220	1-124-478-11	ELECT	100MF	20%	25V	
C221	1-101-004-00	CERAMIC	0.01MF		50V	
C222	1-124-477-11	ELECT	47MF	20%	25V	
C223	1-124-477-11	ELECT	47MF	20%	25V	
C225	1-101-004-00	CERAMIC	0.01MF		50V	
C226	1-101-004-00	CERAMIC	0.01MF		50V	
C227	1-124-478-11	ELECT	100MF	20%	25V	
C228	1-124-478-11	ELECT	100MF	20%	25V	
C301	1-102-973-00	CERAMIC	100PF	5%	50V	
C302	1-102-973-00	CERAMIC	100PF	5%	50V	
C303	1-102-959-00	CERAMIC	22PF	10%	50V	
C304	1-101-004-00	CERAMIC	0.01MF		50V	
C305	1-101-004-00	CERAMIC	0.01MF		50V	
C306	1-124-477-11	ELECT	47MF	20%	25V	
C307	1-101-004-00	CERAMIC	0.01MF		50V	
C308	1-101-004-00	CERAMIC	0.01MF		50V	
C309	1-102-973-00	CERAMIC	100PF	5%	50V	
C310	1-124-478-11	ELECT	100MF	20%	25V	
C311	1-101-004-00	CERAMIC	0.01MF		50V	
C312	1-124-477-11	ELECT	47MF	20%	25V	
C313	1-124-477-11	ELECT	47MF	20%	25V	
C314	1-102-816-00	CERAMIC	120PF	5%	50V	
C315	1-101-004-00	CERAMIC	0.01MF		50V	
C316	1-101-004-00	CERAMIC	0.01MF		50V	
C317	1-124-477-11	ELECT	47MF	20%	25V	
C319	1-102-953-00	CERAMIC	18PF	5%	50V	
C320	1-124-478-11	ELECT	100MF	20%	25V	
C321	1-101-004-00	CERAMIC	0.01MF		50V	
C322	1-124-477-11	ELECT	47MF	20%	25V	
C323	1-124-477-11	ELECT	47MF	20%	25V	
C325	1-101-004-00	CERAMIC	0.01MF		50V	
C326	1-101-004-00	CERAMIC	0.01MF		50V	
C327	1-124-478-11	ELECT	100MF	20%	25V	
C328	1-124-478-11	ELECT	100MF	20%	25V	

<DIODE>

D1	8-719-911-19	DIODE 1SS119
D2	8-719-911-19	DIODE 1SS119
D3	8-719-911-19	DIODE 1SS119
D4	8-719-911-19	DIODE 1SS119
D5	8-719-153-70	DIODE RD7.5EB2TN
D101	8-719-911-19	DIODE 1SS119
D102	8-719-911-19	DIODE 1SS119
D103	8-719-911-19	DIODE 1SS119
D201	8-719-911-19	DIODE 1SS119
D202	8-719-911-19	DIODE 1SS119
D203	8-719-911-19	DIODE 1SS119
D301	8-719-911-19	DIODE 1SS119
D302	8-719-911-19	DIODE 1SS119
D303	8-719-911-19	DIODE 1SS119

<IC>

IC1	8-759-910-83	IC TL072ACP
IC2	8-759-910-83	IC TL072ACP
IC3	8-757-182-14	IC CX-718D-1
IC4	8-759-400-29	IC AN78L04
IC7	8-759-400-29	IC AN78L04
IC8	8-759-982-46	IC RC79L08A
IC101	8-759-910-83	IC TL072ACP
IC102	8-759-910-83	IC TL072ACP
IC103	8-741-131-30	IC BX-1313
IC104	8-759-015-95	IC MC1595L
IC105	8-741-131-30	IC BX-1313
IC106	8-759-800-81	IC LA7016
IC201	8-759-910-83	IC TL072ACP
IC202	8-759-910-83	IC TL072ACP
IC203	8-741-131-30	IC BX-1313
IC204	8-759-015-95	IC MC1595L
IC205	8-741-131-30	IC BX-1313
IC206	8-759-800-81	IC LA7016
IC301	8-759-910-83	IC TL072ACP
IC302	8-759-910-83	IC TL072ACP
IC303	8-741-131-30	IC BX-1313
IC304	8-759-015-95	IC MC1595L
IC305	8-741-131-30	IC BX-1313
IC306	8-759-800-81	IC LA7016

BC

Ref. No.	Part No.	Description	Remark
		<TRANSISTOR>	
Q1	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q2	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q3	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q101	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q102	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q103	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q104	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q105	8-729-105-47	TRANSISTOR 2SC2026-L	
Q201	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q202	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q203	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q204	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q205	8-729-105-47	TRANSISTOR 2SC2026-L	
Q301	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q302	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q303	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q304	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q305	8-729-105-47	TRANSISTOR 2SC2026-L	
		<RESISTOR>	
R7	1-249-405-11	CARBON 100 5% 1/4W	
R8	1-249-425-11	CARBON 4.7K 5% 1/4W	
R9	1-249-405-11	CARBON 100 5% 1/4W	
R10	1-249-405-11	CARBON 100 5% 1/4W	
R11	1-249-405-11	CARBON 100 5% 1/4W	
R12	1-249-409-11	CARBON 220 5% 1/4W	
R13	1-249-413-11	CARBON 470 5% 1/4W	
R14	1-215-453-00	METAL 22K 1% 1/6W	
R15	1-215-453-00	METAL 22K 1% 1/6W	
R16	1-215-453-00	METAL 22K 1% 1/6W	
R17	1-215-453-00	METAL 22K 1% 1/6W	
R18	1-215-445-00	METAL 10K 1% 1/6W	
R19	1-215-445-00	METAL 10K 1% 1/6W	
R20	1-215-445-00	METAL 10K 1% 1/6W	
R21	1-215-445-00	METAL 10K 1% 1/6W	
R22	1-215-429-00	METAL 2.2K 1% 1/6W	
R23	1-249-435-11	CARBON 33K 5% 1/4W	
R24	1-249-429-11	CARBON 10K 5% 1/4W	
R25	1-249-427-11	CARBON 6.8K 5% 1/4W	
R26	1-249-423-11	CARBON 3.3K 5% 1/4W	
R27	1-249-429-11	CARBON 10K 5% 1/4W	
R28	1-249-421-11	CARBON 2.2K 5% 1/4W	
R29	1-247-903-00	CARBON 1M 5% 1/4W	
R101	1-215-421-00	METAL 1K 1% 1/6W	
R102	1-215-421-00	METAL 1K 1% 1/6W	
R103	1-249-405-11	CARBON 100 5% 1/4W	
R104	1-215-469-00	METAL 100K 1% 1/6W	
R105	1-215-469-00	METAL 100K 1% 1/6W	
R106	1-215-469-00	METAL 100K 1% 1/6W	
R107	1-215-469-00	METAL 100K 1% 1/6W	
R108	1-215-433-00	METAL 3.3K 1% 1/6W	
R109	1-215-445-00	METAL 10K 1% 1/6W	
R110	1-215-445-00	METAL 10K 1% 1/6W	
R111	1-215-445-00	METAL 10K 1% 1/6W	
R112	1-215-445-00	METAL 10K 1% 1/6W	
R113	1-215-445-00	METAL 10K 1% 1/6W	
R114	1-249-413-11	CARBON 470 5% 1/4W	
R115	1-249-415-11	CARBON 680 5% 1/4W	
R116	1-249-417-11	CARBON 1K 5% 1/4W	
R117	1-249-405-11	CARBON 100 5% 1/4W	
R118	1-249-439-11	CARBON 68K 5% 1/4W	
R119	1-249-429-11	CARBON 10K 5% 1/4W	
R120	1-249-421-11	CARBON 2.2K 5% 1/4W	
R121	1-249-405-11	CARBON 100 5% 1/4W	
R122	1-215-457-00	METAL 33K 1% 1/6W	
R123	1-215-407-00	METAL 270 1% 1/6W	
R124	1-215-429-00	METAL 2.2K 1% 1/6W	
R125	1-215-431-00	METAL 2.7K 1% 1/6W	
R126	1-215-443-00	METAL 8.2K 1% 1/6W	
R127	1-215-425-00	METAL 1.5K 1% 1/6W	
R128	1-215-403-00	METAL 180 1% 1/6W	
R129	1-215-403-00	METAL 180 1% 1/6W	
R130	1-215-409-00	METAL 330 1% 1/6W	
R131	1-215-409-00	METAL 330 1% 1/6W	
R132	1-215-457-00	METAL 33K 1% 1/6W	
R133	1-215-415-00	METAL 560 1% 1/6W	
R134	1-215-417-00	METAL 680 1% 1/6W	
R135	1-249-439-11	CARBON 68K 5% 1/4W	
R136	1-249-405-11	CARBON 100 5% 1/4W	
R137	1-249-429-11	CARBON 10K 5% 1/4W	
R138	1-249-405-11	CARBON 100 5% 1/4W	
R139	1-249-421-11	CARBON 2.2K 5% 1/4W	
R140	1-249-385-11	CARBON 2.2 5% 1/4W	
R141	1-249-385-11	CARBON 2.2 5% 1/4W	
R142	1-249-405-11	CARBON 100 5% 1/4W	
R143	1-249-423-11	CARBON 3.3K 5% 1/4W	
R144	1-249-405-11	CARBON 100 5% 1/4W	
R145	1-249-405-11	CARBON 100 5% 1/4W	
R146	1-249-425-11	CARBON 4.7K 5% 1/4W	
R147	1-249-405-11	CARBON 100 5% 1/4W	
R201	1-215-421-00	METAL 1K 1% 1/6W	
R202	1-215-421-00	METAL 1K 1% 1/6W	
R203	1-249-405-11	CARBON 100 5% 1/4W	
R204	1-215-469-00	METAL 100K 1% 1/6W	
R205	1-215-469-00	METAL 100K 1% 1/6W	
R206	1-215-469-00	METAL 100K 1% 1/6W	
R207	1-215-469-00	METAL 100K 1% 1/6W	
R208	1-215-433-00	METAL 3.3K 1% 1/6W	
R209	1-215-445-00	METAL 10K 1% 1/6W	
R210	1-215-445-00	METAL 10K 1% 1/6W	
R211	1-215-445-00	METAL 10K 1% 1/6W	
R212	1-215-445-00	METAL 10K 1% 1/6W	
R213	1-215-445-00	METAL 10K 1% 1/6W	
R214	1-249-413-11	CARBON 470 5% 1/4W	
R215	1-249-415-11	CARBON 680 5% 1/4W	
R216	1-249-417-11	CARBON 1K 5% 1/4W	
R217	1-249-405-11	CARBON 100 5% 1/4W	
R218	1-249-439-11	CARBON 68K 5% 1/4W	
R219	1-249-429-11	CARBON 10K 5% 1/4W	
R220	1-249-421-11	CARBON 2.2K 5% 1/4W	
R221	1-249-405-11	CARBON 100 5% 1/4W	
R222	1-215-457-00	METAL 33K 1% 1/6W	
R223	1-215-407-00	METAL 270 1% 1/6W	
R224	1-215-429-00	METAL 2.2K 1% 1/6W	
R225	1-215-431-00	METAL 2.7K 1% 1/6W	
R226	1-215-443-00	METAL 8.2K 1% 1/6W	
R227	1-215-425-00	METAL 1.5K 1% 1/6W	
R228	1-215-403-00	METAL 180 1% 1/6W	
R229	1-215-403-00	METAL 180 1% 1/6W	
R230	1-215-409-00	METAL 330 1% 1/6W	

Ref. No.	Part No.	Description				Remark
R231	1-215-409-00	METAL	330	1%	1/6W	
R232	1-215-457-00	METAL	33K	1%	1/6W	
R233	1-215-415-00	METAL	560	1%	1/6W	
R234	1-215-417-00	METAL	680	1%	1/6W	
R235	1-249-439-11	CARBON	68K	5%	1/4W	
R236	1-249-405-11	CARBON	100	5%	1/4W	
R237	1-249-429-11	CARBON	10K	5%	1/4W	
R238	1-249-405-11	CARBON	100	5%	1/4W	
R239	1-249-421-11	CARBON	2.2K	5%	1/4W	
R240	1-249-385-11	CARBON	2.2	5%	1/4W	
R241	1-249-385-11	CARBON	2.2	5%	1/4W	
R242	1-249-405-11	CARBON	100	5%	1/4W	
R243	1-249-423-11	CARBON	3.3K	5%	1/4W	
R244	1-249-405-11	CARBON	100	5%	1/4W	
R245	1-249-405-11	CARBON	100	5%	1/4W	
R246	1-249-425-11	CARBON	4.7K	5%	1/4W	
R247	1-249-405-11	CARBON	100	5%	1/4W	
R301	1-215-421-00	METAL	1K	1%	1/6W	
R302	1-215-421-00	METAL	1K	1%	1/6W	
R303	1-249-405-11	CARBON	100	5%	1/4W	
R304	1-215-469-00	METAL	100K	1%	1/6W	
R305	1-215-469-00	METAL	100K	1%	1/6W	
R306	1-215-469-00	METAL	100K	1%	1/6W	
R307	1-215-469-00	METAL	100K	1%	1/6W	
R308	1-215-433-00	METAL	3.3K	1%	1/6W	
R309	1-215-445-00	METAL	10K	1%	1/6W	
R310	1-215-445-00	METAL	10K	1%	1/6W	
R311	1-215-445-00	METAL	10K	1%	1/6W	
R312	1-215-445-00	METAL	10K	1%	1/6W	
R313	1-215-445-00	METAL	10K	1%	1/6W	
R314	1-249-413-11	CARBON	470	5%	1/4W	
R315	1-249-415-11	CARBON	680	5%	1/4W	
R316	1-249-417-11	CARBON	1K	5%	1/4W	
R317	1-249-405-11	CARBON	100	5%	1/4W	
R318	1-249-439-11	CARBON	68K	5%	1/4W	
R319	1-249-429-11	CARBON	10K	5%	1/4W	
R320	1-249-421-11	CARBON	2.2K	5%	1/4W	
R321	1-249-405-11	CARBON	100	5%	1/4W	
R322	1-215-457-00	METAL	33K	1%	1/6W	
R323	1-215-407-00	METAL	270	1%	1/6W	
R324	1-215-429-00	METAL	2.2K	1%	1/6W	
R325	1-215-431-00	METAL	2.7K	1%	1/6W	
R326	1-215-443-00	METAL	8.2K	1%	1/6W	
R327	1-215-425-00	METAL	1.5K	1%	1/6W	
R328	1-215-403-00	METAL	180	1%	1/6W	
R329	1-215-403-00	METAL	180	1%	1/6W	
R330	1-215-409-00	METAL	330	1%	1/6W	
R331	1-215-409-00	METAL	330	1%	1/6W	
R332	1-215-457-00	METAL	33K	1%	1/6W	
R333	1-215-415-00	METAL	560	1%	1/6W	
R334	1-215-417-00	METAL	680	1%	1/6W	
R335	1-249-439-11	CARBON	68K	5%	1/4W	
R336	1-249-405-11	CARBON	100	5%	1/4W	
R337	1-249-429-11	CARBON	10K	5%	1/4W	
R338	1-249-405-11	CARBON	100	5%	1/4W	
R339	1-249-421-11	CARBON	2.2K	5%	1/4W	
R340	1-249-385-11	CARBON	2.2	5%	1/4W	
R341	1-249-385-11	CARBON	2.2	5%	1/4W	
R342	1-249-405-11	CARBON	100	5%	1/4W	
R343	1-249-423-11	CARBON	3.3K	5%	1/4W	
R344	1-249-405-11	CARBON	100	5%	1/4W	
R345	1-249-405-11	CARBON	100	5%	1/4W	
R346	1-249-425-11	CARBON	4.7K	5%	1/4W	
R347	1-249-405-11	CARBON	100	5%	1/4W	

<VARIABLE RESISTOR>

RV1	1-237-515-21	RES, ADJ, CERMET 1K	
RV101	1-237-515-21	RES, ADJ, CERMET 1K	
RV102	1-237-515-21	RES, ADJ, CERMET 1K	
RV201	1-237-515-21	RES, ADJ, CERMET 1K	
RV202	1-237-515-21	RES, ADJ, CERMET 1K	
RV301	1-237-515-21	RES, ADJ, CERMET 1K	
RV302	1-237-515-21	RES, ADJ, CERMET 1K	

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*A-1296-450-A	BB BOARD, COMPLETE	
	**********	
*4-353-708-00	HOOK, FINGER	

<CONNECTOR>

BB1	*1-562-729-11	CONNECTOR, MULTI 64P
	4-378-915-01	NUT (M2.6), PLATE; BB1

<CAPACITOR>

C1	1-101-004-00	CERAMIC	0.01MF	50V
C2	1-124-791-11	ELECT	1MF 20%	50V
C3	1-101-888-00	CERAMIC	68PF 5%	50V
C4	1-123-330-00	ELECT	22MF 20%	25V
C5	1-101-004-00	CERAMIC	0.01MF	50V
C6	1-124-791-11	ELECT	1MF 20%	50V
C7	1-101-004-00	CERAMIC	0.01MF	50V
C8	1-124-791-11	ELECT	1MF 20%	50V
C9	1-102-972-00	CERAMIC	91PF 5%	50V
C10	1-101-004-00	CERAMIC	0.01MF	50V
C11	1-101-004-00	CERAMIC	0.01MF	50V
C12	1-102-944-00	CERAMIC	7PF 1PF	50V
C13	1-123-330-00	ELECT	22MF 20%	25V
C14	1-101-004-00	CERAMIC	0.01MF	50V
C15	1-101-004-00	CERAMIC	0.01MF	50V
C16	1-101-888-00	CERAMIC	68PF 5%	50V
C17	1-123-330-00	ELECT	22MF 20%	25V
C18	1-101-004-00	CERAMIC	0.01MF	50V
C19	1-101-004-00	CERAMIC	0.01MF	50V
C20	1-102-972-00	CERAMIC	91PF 5%	50V
C21	1-102-944-00	CERAMIC	7PF 1PF	50V
C22	1-123-330-00	ELECT	22MF 20%	25V
C23	1-101-004-00	CERAMIC	0.01MF	50V
C24	1-101-888-00	CERAMIC	68PF 5%	50V
C25	1-123-330-00	ELECT	22MF 20%	25V
C26	1-101-004-00	CERAMIC	0.01MF	50V
C27	1-101-004-00	CERAMIC	0.01MF	50V
C28	1-102-972-00	CERAMIC	91PF 5%	50V
C29	1-102-944-00	CERAMIC	7PF 1PF	50V
C30	1-123-330-00	ELECT	22MF 20%	25V
C31	1-102-935-00	CERAMIC	2PF 0.25PF	50V
C32	1-101-888-00	CERAMIC	68PF 5%	50V
C33	1-123-330-00	ELECT	22MF 20%	25V
C34	1-124-277-11	ELECT	4.7MF 20%	35V
C35	1-126-101-11	ELECT	100MF 20%	16V
C36	1-123-330-00	ELECT	22MF 20%	25V

BB

Ref. No.	Part No.	Description				Remark
C37	1-124-126-00	ELECT	47MF	20%	16V	
C38	1-123-321-00	ELECT	220MF	20%	16V	
C39	1-101-004-00	CERAMIC	0.01MF		50V	
C40	1-124-126-00	ELECT	47MF	20%	16V	
C41	1-101-004-00	CERAMIC	0.01MF		50V	
C42	1-124-126-00	ELECT	47MF	20%	16V	
C43	1-123-330-00	ELECT	22MF	20%	25V	
C44	1-101-004-00	CERAMIC	0.01MF		50V	
C45	1-124-126-00	ELECT	47MF	20%	16V	
C46	1-123-321-00	ELECT	220MF	20%	16V	
C47	1-101-004-00	CERAMIC	0.01MF		50V	
C48	1-124-126-00	ELECT	47MF	20%	16V	
C49	1-124-126-00	ELECT	47MF	20%	16V	
C50	1-101-004-00	CERAMIC	0.01MF		50V	
C51	1-124-126-00	ELECT	47MF	20%	16V	
C52	1-123-330-00	ELECT	22MF	20%	25V	
C53	1-101-004-00	CERAMIC	0.01MF		50V	
C54	1-124-126-00	ELECT	47MF	20%	16V	
C55	1-101-004-00	CERAMIC	0.01MF		50V	
C56	1-123-330-00	ELECT	22MF	20%	25V	
C57	1-123-330-00	ELECT	22MF	20%	25V	
C58	1-123-330-00	ELECT	22MF	20%	25V	
C59	1-123-330-00	ELECT	22MF	20%	25V	
C60	1-123-330-00	ELECT	22MF	20%	25V	
C61	1-123-330-00	ELECT	22MF	20%	25V	
C62	1-123-330-00	ELECT	22MF	20%	25V	
C63	1-123-330-00	ELECT	22MF	20%	25V	
C64	1-123-330-00	ELECT	22MF	20%	25V	
C65	1-123-330-00	ELECT	22MF	20%	25V	
C66	1-123-330-00	ELECT	22MF	20%	25V	
C67	1-123-330-00	ELECT	22MF	20%	25V	
C68	1-123-330-00	ELECT	22MF	20%	25V	
C69	1-123-330-00	ELECT	22MF	20%	25V	
C70	1-123-330-00	ELECT	22MF	20%	25V	
C71	1-123-330-00	ELECT	22MF	20%	25V	
C72	1-123-330-00	ELECT	22MF	20%	25V	
C73	1-123-330-00	ELECT	22MF	20%	25V	
C74	1-123-330-00	ELECT	22MF	20%	25V	
C75	1-123-330-00	ELECT	22MF	20%	25V	
C76	1-101-004-00	CERAMIC	0.01MF		50V	
C77	1-101-004-00	CERAMIC	0.01MF		50V	
C78	1-101-004-00	CERAMIC	0.01MF		50V	
C79	1-101-004-00	CERAMIC	0.01MF		50V	
C80	1-101-004-00	CERAMIC	0.01MF		50V	
C81	1-101-004-00	CERAMIC	0.01MF		50V	
C82	1-101-004-00	CERAMIC	0.01MF		50V	
C83	1-101-004-00	CERAMIC	0.01MF		50V	
C84	1-101-004-00	CERAMIC	0.01MF		50V	
C85	1-101-004-00	CERAMIC	0.01MF		50V	
C86	1-101-004-00	CERAMIC	0.01MF		50V	
C87	1-101-004-00	CERAMIC	0.01MF		50V	
C88	1-101-004-00	CERAMIC	0.01MF		50V	
C89	1-101-004-00	CERAMIC	0.01MF		50V	
C90	1-101-004-00	CERAMIC	0.01MF		50V	
C91	1-124-282-00	ELECT	22MF	20%	16V	
C92	1-124-282-00	ELECT	22MF	20%	16V	
C93	1-124-282-00	ELECT	22MF	20%	16V	
C94	1-124-282-00	ELECT	22MF	20%	16V	
C95	1-124-282-00	ELECT	22MF	20%	16V	
C96	1-124-282-00	ELECT	22MF	20%	16V	
C97	1-124-282-00	ELECT	22MF	20%	16V	
C98	1-124-282-00	ELECT	22MF	20%	16V	
C99	1-124-282-00	ELECT	22MF	20%	16V	

<DIODE>

D1	8-719-911-19	DIODE 1SS119	
D2	8-719-911-19	DIODE 1SS119	
D3	8-719-911-19	DIODE 1SS119	
D4	8-719-110-41	DIODE RD15ESB2	
D5	8-719-911-19	DIODE 1SS119	
D6	8-719-109-93	DIODE RD6.2ESB2	
D7	8-719-110-41	DIODE RD15ESB2	
D8	8-719-911-19	DIODE 1SS119	
D9	8-719-110-41	DIODE RD15ESB2	
D10	8-719-110-13	DIODE RD9.1ESB2	
D11	8-719-110-41	DIODE RD15ESB2	
D12	8-719-109-93	DIODE RD6.2ESB2	
D13	8-719-911-19	DIODE 1SS119	
D14	8-719-110-13	DIODE RD9.1ESB2	
D15	8-719-109-93	DIODE RD6.2ESB2	
D16	8-719-911-19	DIODE 1SS119	
D17	8-719-110-13	DIODE RD9.1ESB2	
D18	8-719-911-19	DIODE 1SS119	
D19	8-719-110-13	DIODE RD9.1ESB2	
D20	8-719-911-19	DIODE 1SS119	
D21	8-719-109-81	DIODE RD4.7ESB2	
D22	8-719-110-17	DIODE RD10ESB2	
D23	8-719-110-22	DIODE RD11ESB2	
D24	8-719-109-89	DIODE RD5.6ESB2	
D25	8-719-110-13	DIODE RD9.1ESB2	
D26	8-719-110-17	DIODE RD10ESB2	

<DELAY LINE>

DL1	1-415-466-11	DELAY LINE
DL2	1-415-466-11	DELAY LINE
DL3	1-415-466-11	DELAY LINE
DL4	1-415-465-11	DELAY LINE
DL5	1-415-465-11	DELAY LINE
DL6	1-415-464-11	DELAY LINE

<IC>

IC1	8-759-800-81	IC LA7016
IC2	8-759-800-81	IC LA7016
IC3	8-759-800-81	IC LA7016
IC4	8-741-119-00	IC BX-1190
IC5	8-741-119-00	IC BX-1190
IC6	8-759-800-81	IC LA7016
IC7	8-759-800-81	IC LA7016
IC8	8-759-800-81	IC LA7016
IC9	8-759-800-81	IC LA7016
IC10	8-759-800-81	IC LA7016
IC11	8-759-800-81	IC LA7016

<JACK>

J1	1-560-914-00	POST, CONNECTOR 2P
	*1-561-724-00	SOCKET, CONNECTOR 2P ;J1
J2	1-560-914-00	POST, CONNECTOR 2P
	*1-561-724-00	SOCKET, CONNECTOR 2P ;J2

BB

Ref. No.	Part No.	Description	Remark
		<TRANSISTOR>	
Q1	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q2	8-729-105-88	TRANSISTOR 2SC2570A	
Q3	8-729-105-88	TRANSISTOR 2SC2570A	
Q4	8-729-105-88	TRANSISTOR 2SC2570A	
Q5	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q6	8-729-105-88	TRANSISTOR 2SC2570A	
Q7	8-729-105-88	TRANSISTOR 2SC2570A	
Q8	8-729-105-88	TRANSISTOR 2SC2570A	
Q9	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q10	8-729-105-88	TRANSISTOR 2SC2570A	
Q11	8-729-105-88	TRANSISTOR 2SC2570A	
Q12	8-729-105-88	TRANSISTOR 2SC2570A	
Q13	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q14	8-729-105-88	TRANSISTOR 2SC2570A	
Q15	8-729-105-88	TRANSISTOR 2SC2570A	
Q16	8-729-105-88	TRANSISTOR 2SC2570A	
Q17	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q18	8-729-105-88	TRANSISTOR 2SC2570A	
Q19	8-729-105-88	TRANSISTOR 2SC2570A	
Q20	8-729-105-88	TRANSISTOR 2SC2570A	
Q21	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q22	8-729-105-88	TRANSISTOR 2SC2570A	
Q23	8-729-105-88	TRANSISTOR 2SC2570A	
Q24	8-729-105-88	TRANSISTOR 2SC2570A	
Q25	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q26	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q27	8-729-105-88	TRANSISTOR 2SC2570A	
Q28	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q29	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q30	8-729-105-88	TRANSISTOR 2SC2570A	
Q31	8-729-105-88	TRANSISTOR 2SC2570A	
Q32	8-729-105-88	TRANSISTOR 2SC2570A	
Q33	8-729-105-88	TRANSISTOR 2SC2570A	
Q34	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q35	8-729-105-88	TRANSISTOR 2SC2570A	
Q36	8-729-105-88	TRANSISTOR 2SC2570A	
Q37	8-729-378-84	TRANSISTOR 2SD788-5	
Q38	8-729-378-84	TRANSISTOR 2SD788-5	
Q39	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q40	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q41	8-729-600-82	TRANSISTOR 2SA1282-F	
Q42	8-729-600-82	TRANSISTOR 2SA1282-F	
Q43	8-729-119-76	TRANSISTOR 2SA1175-HFE	
		<RESISTOR>	
R1	1-249-435-11	CARBON 33K 5% 1/4W	
R2	1-249-429-11	CARBON 10K 5% 1/4W	
R3	1-249-405-11	CARBON 100 5% 1/4W	
R4	1-249-405-11	CARBON 100 5% 1/4W	
R5	1-249-427-11	CARBON 6.8K 5% 1/4W	
R6	1-249-405-11	CARBON 100 5% 1/4W	
R7	1-249-405-11	CARBON 100 5% 1/4W	
R8	1-249-435-11	CARBON 33K 5% 1/4W	
R9	1-249-423-11	CARBON 3.3K 5% 1/4W	
R10	1-249-405-11	CARBON 100 5% 1/4W	
R11	1-249-405-11	CARBON 100 5% 1/4W	
R12	1-249-405-11	CARBON 100 5% 1/4W	
R13	1-249-421-11	CARBON 2.2K 5% 1/4W	
R14	1-215-421-00	METAL 1K 1% 1/6W	
R15	1-249-405-11	CARBON 100 5% 1/4W	
R16	1-215-439-00	METAL 5.6K 1% 1/6W	
R17	1-215-459-00	METAL 39K 1% 1/6W	
R18	1-215-421-00	METAL 1K 1% 1/6W	
R19	1-249-437-11	CARBON 47K 5% 1/4W	
R20	1-215-413-00	METAL 470 1% 1/6W	
R21	1-215-384-00	METAL 30 1% 1/6W	
R22	1-215-407-00	METAL 270 1% 1/6W	
R25	1-215-429-00	METAL 2.2K 1% 1/6W	
R26	1-215-443-00	METAL 8.2K 1% 1/6W	
R27	1-249-405-11	CARBON 100 5% 1/4W	
R28	1-215-413-00	METAL 470 1% 1/6W	
R29	1-249-417-11	CARBON 1K 5% 1/4W	
R30	1-249-405-11	CARBON 100 5% 1/4W	
R31	1-249-421-11	CARBON 2.2K 5% 1/4W	
R32	1-249-405-11	CARBON 100 5% 1/4W	
R33	1-249-405-11	CARBON 100 5% 1/4W	
R34	1-249-427-11	CARBON 6.8K 5% 1/4W	
R35	1-249-405-11	CARBON 100 5% 1/4W	
R36	1-249-435-11	CARBON 33K 5% 1/4W	
R37	1-249-405-11	CARBON 100 5% 1/4W	
R38	1-215-429-00	METAL 2.2K 1% 1/6W	
R39	1-249-405-11	CARBON 100 5% 1/4W	
R40	1-249-405-11	CARBON 100 5% 1/4W	
R41	1-249-405-11	CARBON 100 5% 1/4W	
R42	1-249-418-11	CARBON 1.2K 5% 1/4W	
R43	1-215-397-00	METAL 100 1% 1/6W	
R44	1-215-397-00	METAL 100 1% 1/6W	
R45	1-249-405-11	CARBON 100 5% 1/4W	
R46	1-249-405-11	CARBON 100 5% 1/4W	
R47	1-249-427-11	CARBON 6.8K 5% 1/4W	
R48	1-249-405-11	CARBON 100 5% 1/4W	
R49	1-249-435-11	CARBON 33K 5% 1/4W	
R50	1-249-431-11	CARBON 15K 5% 1/4W	
R51	1-215-405-00	METAL 220 1% 1/6W	
R52	1-215-411-00	METAL 390 1% 1/6W	
R53	1-215-429-00	METAL 2.2K 1% 1/6W	
R55	1-249-405-11	CARBON 100 5% 1/4W	
R56	1-215-415-00	METAL 560 1% 1/6W	
R57	1-249-405-11	CARBON 100 5% 1/4W	
R58	1-249-405-11	CARBON 100 5% 1/4W	
R59	1-249-421-11	CARBON 2.2K 5% 1/4W	
R60	1-215-393-00	METAL 68 1% 1/6W	
R61	1-249-429-11	CARBON 10K 5% 1/4W	
R62	1-249-405-11	CARBON 100 5% 1/4W	
R63	1-215-394-00	METAL 75 1% 1/6W	
R64	1-249-405-11	CARBON 100 5% 1/4W	
R65	1-249-427-11	CARBON 6.8K 5% 1/4W	
R66	1-249-405-11	CARBON 100 5% 1/4W	
R67	1-249-435-11	CARBON 33K 5% 1/4W	
R68	1-249-405-11	CARBON 100 5% 1/4W	
R69	1-249-423-11	CARBON 3.3K 5% 1/4W	
R70	1-249-405-11	CARBON 100 5% 1/4W	
R71	1-249-405-11	CARBON 100 5% 1/4W	
R72	1-249-405-11	CARBON 100 5% 1/4W	
R73	1-249-421-11	CARBON 2.2K 5% 1/4W	
R74	1-249-437-11	CARBON 47K 5% 1/4W	
R75	1-215-413-00	METAL 470 1% 1/6W	
R76	1-215-393-00	METAL 68 1% 1/6W	
R77	1-215-420-00	METAL 910 1% 1/6W	
R78	1-215-391-00	METAL 56 1% 1/6W	
R79	1-215-428-00	METAL 2K 1% 1/6W	

BB

Ref. No.	Part No.	Description				Remark
R80	1-215-429-00	METAL	2.2K	1%	1/6W	
R81	1-215-443-00	METAL	8.2K	1%	1/6W	
R82	1-249-405-11	CARBON	100	5%	1/4W	
R83	1-215-413-00	METAL	470	1%	1/6W	
R84	1-249-417-11	CARBON	1K	5%	1/4W	
R85	1-249-405-11	CARBON	100	5%	1/4W	
R86	1-249-421-11	CARBON	2.2K	5%	1/4W	
R87	1-249-405-11	CARBON	100	5%	1/4W	
R88	1-249-405-11	CARBON	100	5%	1/4W	
R89	1-249-405-11	CARBON	100	5%	1/4W	
R90	1-249-405-11	CARBON	100	5%	1/4W	
R91	1-215-429-00	METAL	2.2K	1%	1/6W	
R92	1-249-405-11	CARBON	100	5%	1/4W	
R93	1-249-405-11	CARBON	100	5%	1/4W	
R94	1-249-405-11	CARBON	100	5%	1/4W	
R95	1-249-418-11	CARBON	1.2K	5%	1/4W	
R96	1-215-397-00	METAL	100	1%	1/6W	
R97	1-215-397-00	METAL	100	1%	1/6W	
R98	1-249-405-11	CARBON	100	5%	1/4W	
R99	1-249-405-11	CARBON	100	5%	1/4W	
R100	1-249-405-11	CARBON	100	5%	1/4W	
R101	1-249-431-11	CARBON	15K	5%	1/4W	
R102	1-215-405-00	METAL	220	1%	1/6W	
R103	1-215-411-00	METAL	390	1%	1/6W	
R104	1-215-429-00	METAL	2.2K	1%	1/6W	
R106	1-249-405-11	CARBON	100	5%	1/4W	
R107	1-215-415-00	METAL	560	1%	1/6W	
R108	1-249-405-11	CARBON	100	5%	1/4W	
R109	1-249-405-11	CARBON	100	5%	1/4W	
R110	1-249-421-11	CARBON	2.2K	5%	1/4W	
R111	1-215-393-00	METAL	68	1%	1/6W	
R112	1-249-429-11	CARBON	10K	5%	1/4W	
R113	1-249-405-11	CARBON	100	5%	1/4W	
R114	1-249-405-11	CARBON	100	5%	1/4W	
R115	1-249-405-11	CARBON	100	5%	1/4W	
R116	1-249-405-11	CARBON	100	5%	1/4W	
R117	1-249-423-11	CARBON	3.3K	5%	1/4W	
R118	1-249-405-11	CARBON	100	5%	1/4W	
R119	1-249-405-11	CARBON	100	5%	1/4W	
R120	1-249-405-11	CARBON	100	5%	1/4W	
R121	1-249-421-11	CARBON	2.2K	5%	1/4W	
R122	1-215-421-00	METAL	1K	1%	1/6W	
R123	1-249-405-11	CARBON	100	5%	1/4W	
R124	1-215-439-00	METAL	5.6K	1%	1/6W	
R125	1-215-459-00	METAL	39K	1%	1/6W	
R126	1-215-421-00	METAL	1K	1%	1/6W	
R127	1-249-437-11	CARBON	47K	5%	1/4W	
R128	1-215-413-00	METAL	470	1%	1/6W	
R131	1-215-379-00	METAL	18	1%	1/6W	
R132	1-215-406-00	METAL	240	1%	1/6W	
R133	1-215-429-00	METAL	2.2K	1%	1/6W	
R134	1-215-443-00	METAL	8.2K	1%	1/6W	
R135	1-249-405-11	CARBON	100	5%	1/4W	
R136	1-215-413-00	METAL	470	1%	1/6W	
R137	1-249-417-11	CARBON	1K	5%	1/4W	
R138	1-249-405-11	CARBON	100	5%	1/4W	
R139	1-249-421-11	CARBON	2.2K	5%	1/4W	
R140	1-249-405-11	CARBON	100	5%	1/4W	
R141	1-249-405-11	CARBON	100	5%	1/4W	
R142	1-249-405-11	CARBON	100	5%	1/4W	
R143	1-249-405-11	CARBON	100	5%	1/4W	
R144	1-215-429-00	METAL	2.2K	1%	1/6W	

Ref. No.	Part No.	Description				Remark
R145	1-249-405-11	CARBON	100	5%	1/4W	
R146	1-249-405-11	CARBON	100	5%	1/4W	
R147	1-249-405-11	CARBON	100	5%	1/4W	
R148	1-249-418-11	CARBON	1.2K	5%	1/4W	
R149	1-215-397-00	METAL	100	1%	1/6W	
R150	1-215-397-00	METAL	100	1%	1/6W	
R151	1-249-405-11	CARBON	100	5%	1/4W	
R152	1-249-405-11	CARBON	100	5%	1/4W	
R153	1-249-405-11	CARBON	100	5%	1/4W	
R154	1-249-431-11	CARBON	15K	5%	1/4W	
R155	1-215-405-00	METAL	220	1%	1/6W	
R156	1-215-411-00	METAL	390	1%	1/6W	
R157	1-215-429-00	METAL	2.2K	1%	1/6W	
R159	1-249-405-11	CARBON	100	5%	1/4W	
R160	1-215-415-00	METAL	560	1%	1/6W	
R161	1-249-405-11	CARBON	100	5%	1/4W	
R162	1-249-405-11	CARBON	100	5%	1/4W	
R163	1-249-421-11	CARBON	2.2K	5%	1/4W	
R164	1-215-393-00	METAL	68	1%	1/6W	
R165	1-215-405-00	METAL	220	1%	1/6W	
R166	1-215-429-00	METAL	2.2K	1%	1/6W	
R167	1-215-401-11	METAL	150	1%	1/6W	
R168	1-215-401-11	METAL	150	1%	1/6W	
R169	1-215-421-00	METAL	1K	1%	1/6W	
R170	1-215-429-00	METAL	2.2K	1%	1/6W	
R171	1-215-455-00	METAL	27K	1%	1/6W	
R172	1-215-415-00	METAL	560	1%	1/6W	
R173	1-215-429-00	METAL	2.2K	1%	1/6W	
R174	1-249-405-11	CARBON	100	5%	1/4W	
R175	1-249-401-11	CARBON	47	5%	1/4W	
R176	1-249-426-11	CARBON	5.6K	5%	1/4W	
R177	1-249-411-11	CARBON	330	5%	1/4W	
R178	1-249-437-11	CARBON	47K	5%	1/4W	
R179	1-249-423-11	CARBON	3.3K	5%	1/4W	
R180	1-249-405-11	CARBON	100	5%	1/4W	
R181	1-249-405-11	CARBON	100	5%	1/4W	
R182	1-249-405-11	CARBON	100	5%	1/4W	
R183	1-249-421-11	CARBON	2.2K	5%	1/4W	
R184	1-249-405-11	CARBON	100	5%	1/4W	
R185	1-249-415-11	CARBON	680	5%	1/4W	
R186	1-249-405-11	CARBON	100	5%	1/4W	
R187	1-215-397-00	METAL	100	1%	1/6W	
R188	1-215-397-00	METAL	100	1%	1/6W	
R189	1-249-405-11	CARBON	100	5%	1/4W	
R190	1-249-423-11	CARBON	3.3K	5%	1/4W	
R191	1-249-405-11	CARBON	100	5%	1/4W	
R192	1-249-405-11	CARBON	100	5%	1/4W	
R193	1-249-405-11	CARBON	100	5%	1/4W	
R194	1-249-415-11	CARBON	680	5%	1/4W	
R195	1-215-397-00	METAL	100	1%	1/6W	
R196	1-215-397-00	METAL	100	1%	1/6W	
R197	1-249-405-11	CARBON	100	5%	1/4W	
R198	1-249-405-11	CARBON	100	5%	1/4W	
R199	1-249-421-11	CARBON	2.2K	5%	1/4W	
R200	1-215-428-00	METAL	2K	1%	1/6W	
R201	1-215-407-00	METAL	270	1%	1/6W	
R202	1-215-441-00	METAL	6.8K	1%	1/6W	
R203	1-215-437-00	METAL	4.7K	1%	1/6W	
R204	1-249-401-11	CARBON	47	5%	1/4W	
R205	1-215-403-00	METAL	180	1%	1/6W	
R206	1-215-409-00	METAL	330	1%	1/6W	
R207	1-215-435-00	METAL	3.9K	1%	1/6W	

Ref. No.	Part No.	Description				Remark
R208	1-215-433-00	METAL	3.3K	1%	1/6W	
R209	1-249-405-11	CARBON	100	5%	1/4W	
R210	1-249-405-11	CARBON	100	5%	1/4W	
R211	1-215-429-00	METAL	2.2K	1%	1/6W	
R212	1-215-405-00	METAL	220	1%	1/6W	
R213	1-215-391-00	METAL	56	1%	1/6W	
R214	1-215-413-00	METAL	470	1%	1/6W	
R215	1-215-417-00	METAL	680	1%	1/6W	
R216	1-249-405-11	CARBON	100	5%	1/4W	
R217	1-249-405-11	CARBON	100	5%	1/4W	
R218	1-249-422-11	CARBON	2.7K	5%	1/4W	
R219	1-215-397-00	METAL	100	1%	1/6W	
R220	1-215-397-00	METAL	100	1%	1/6W	
R221	1-249-422-11	CARBON	2.7K	5%	1/4W	
R222	1-247-736-11	CARBON	56	5%	1/2W	
R223	1-249-417-11	CARBON	1K	5%	1/4W	
R224	1-249-438-11	CARBON	56K	5%	1/4W	
R225	1-249-426-11	CARBON	5.6K	5%	1/4W	
R226	1-249-437-11	CARBON	47K	5%	1/4W	
R227	1-249-417-11	CARBON	1K	5%	1/4W	
R228	1-247-731-11	CARBON	22	5%	1/2W	
R229	1-249-417-11	CARBON	1K	5%	1/4W	
R230	1-249-441-11	CARBON	100K	5%	1/4W	
R231	1-249-441-11	CARBON	100K	5%	1/4W	
R232	1-215-419-00	METAL	820	1%	1/6W	
R233	1-215-455-00	METAL	27K	1%	1/6W	
R236	1-215-415-00	METAL	560	1%	1/6W	
R237	1-215-432-00	METAL	3K	1%	1/6W	
R239	1-249-409-11	CARBON	220	5%	1/4W	
R240	1-249-438-11	CARBON	56K	5%	1/4W	
R241	1-249-438-11	CARBON	56K	5%	1/4W	
R242	1-249-438-11	CARBON	56K	5%	1/4W	
R243	1-249-438-11	CARBON	56K	5%	1/4W	
R244	1-249-438-11	CARBON	56K	5%	1/4W	
R245	1-249-438-11	CARBON	56K	5%	1/4W	
R246	1-249-438-11	CARBON	56K	5%	1/4W	
R247	1-249-438-11	CARBON	56K	5%	1/4W	
R248	1-249-438-11	CARBON	56K	5%	1/4W	
R249	1-249-409-11	CARBON	220	5%	1/4W	
		<VARIABLE RESISTOR>				
RV1	1-237-512-21	RES, ADJ, CERMET 100				
RV2	1-237-512-21	RES, ADJ, CERMET 100				
RV3	1-237-512-21	RES, ADJ, CERMET 100				
RV4	1-237-513-21	RES, ADJ, CERMET 200				
RV5	1-237-512-21	RES, ADJ, CERMET 100				
RV6	1-237-513-21	RES, ADJ, CERMET 200				
RV7	1-237-513-21	RES, ADJ, CERMET 200				
RV8	1-237-513-21	RES, ADJ, CERMET 200				
RV9	1-237-512-21	RES, ADJ, CERMET 100				
RV10	1-237-512-21	RES, ADJ, CERMET 100				
RV11	1-237-512-21	RES, ADJ, CERMET 100				
**********						
	*A-1296-451-A	BE BOARD, COMPLETE				
		**********				
	*4-353-708-00	HOOK, FINGER				
	4-378-915-01	NUT (M2.6), PLATE				

Ref. No.	Part No.	Description				Remark
		<CONNECTOR>				
BE1	*1-562-729-11	CONNECTOR, MULTI 64P				
		<CAPACITOR>				
C1	1-124-472-11	ELECT	470MF	20%	6.3V	
C2	1-124-120-11	ELECT	220MF	20%	16V	
C3	1-161-051-00	CERAMIC	0.01MF	10%	25V	
C4	1-124-120-11	ELECT	220MF	20%	16V	
C5	1-161-051-00	CERAMIC	0.01MF	10%	25V	
C6	1-124-120-11	ELECT	220MF	20%	16V	
C7	1-124-120-11	ELECT	220MF	20%	16V	
C8	1-161-055-00	CERAMIC	0.022MF	10%	25V	
C9	1-161-051-00	CERAMIC	0.01MF	10%	25V	
C10	1-101-884-00	CERAMIC	56PF	5%	50V	
C11	1-161-051-00	CERAMIC	0.01MF	10%	25V	
C12	1-124-120-11	ELECT	220MF	20%	16V	
C13	1-101-880-00	CERAMIC	47PF	5%	50V	
C14	1-102-816-00	CERAMIC	120PF	5%	50V	
C15	1-102-980-00	CERAMIC	270PF	5%	50V	
C16	1-102-959-00	CERAMIC	22PF	5%	50V	
C17	1-130-475-00	MYLAR	0.0022MF	5%	50V	
C18	1-161-051-00	CERAMIC	0.01MF	10%	25V	
C19	1-161-051-00	CERAMIC	0.01MF	10%	25V	
C20	1-161-051-00	CERAMIC	0.01MF	10%	25V	
C21	1-161-051-00	CERAMIC	0.01MF	10%	25V	
C22	1-161-051-00	CERAMIC	0.01MF	10%	25V	
C23	1-161-051-00	CERAMIC	0.01MF	10%	25V	
C24	1-161-051-00	CERAMIC	0.01MF	10%	25V	
C25	1-161-051-00	CERAMIC	0.01MF	10%	25V	
C26	1-126-176-11	ELECT	220MF	20%	6.3V	
C27	1-161-051-00	CERAMIC	0.01MF	10%	25V	
C28	1-126-176-11	ELECT	220MF	20%	6.3V	
C29	1-161-051-00	CERAMIC	0.01MF	10%	25V	
C30	1-161-051-00	CERAMIC	0.01MF	10%	25V	
C31	1-136-165-00	FILM	0.1MF	5%	50V	
C32	1-136-165-00	FILM	0.1MF	5%	50V	
C34	1-124-791-11	ELECT	1MF	20%	50V	
C35	1-123-330-00	ELECT	22MF	20%	16V	
C36	1-126-101-11	ELECT	100MF	20%	16V	
C38	1-161-051-00	CERAMIC	0.01MF	10%	25V	
C39	1-161-051-00	CERAMIC	0.01MF	10%	25V	
C40	1-161-051-00	CERAMIC	0.01MF	10%	25V	
		<DIODE>				
D1	8-719-911-19	DIODE 1SS119				
D2	8-719-911-19	DIODE 1SS119				
D3	8-719-911-19	DIODE 1SS119				
D4	8-719-911-19	DIODE 1SS119				
D5	8-719-911-19	DIODE 1SS119				
D6	8-719-911-19	DIODE 1SS119				
D8	8-719-911-19	DIODE 1SS119				
D9	8-719-911-19	DIODE 1SS119				
		<IC>				
IC1	8-759-910-00	IC SN74S00N				
IC2	8-759-911-63	IC SN74S163N				
IC3	8-759-901-63	IC SN74LS163AN				
IC4	8-759-901-63	IC SN74LS163AN				
IC5	8-759-901-63	IC SN74LS163AN				

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Ref. No.	Part No.	Description	Remark
IC6	*1-526-658-21	SOCKET, IC (DP) 24P	
IC6	8-759-741-17	IC MB7138E-HSGH	
IC7	8-759-913-74	IC SN74S374N	
IC8	8-759-901-63	IC SN74LS163AN	
IC9	8-759-901-63	IC SN74LS163AN	
IC10	8-759-901-63	IC SN74LS163AN	
IC11	1-526-659-00	SOCKET, IC (DP) 28P	
IC11	8-759-741-18	IC MBM2764-VSGH	
IC12	8-759-901-75	IC SN74LS175N	
IC13	8-759-901-75	IC SN74LS175N	
IC14	8-759-974-06	IC SN7406N	
IC15	*1-526-654-00	SOCKET, IC (DP) 16P	
IC15	8-759-737-17	IC MB7116H-K-PTD	
IC16	8-759-901-37	IC SN74LS137N	
IC17	8-759-974-07	IC SN7407N	
IC18	8-759-901-61	IC SN74LS161AN	
IC19	*1-526-654-00	SOCKET, IC (DP) 16P	
IC19	8-759-988-75	IC MB7116H-K-COMPH	
IC20	8-759-901-75	IC SN74LS175N	
IC21	8-759-910-00	IC SN74S00N	
IC22	8-759-982-25	IC RC78L09A	
IC23	8-759-900-08	IC SN74LS08N	
IC24	8-759-900-32	IC SN74LS32N	
IC25	8-759-900-00	IC SN74LS00N	
IC26	8-759-989-69	IC SN74LS86AN	
IC27	8-759-900-08	IC SN74LS08N	
		<COIL>	
L1	1-408-088-00	INDUCTOR 220UH	
L2	1-408-088-00	INDUCTOR 220UH	
		<TRANSISTOR>	
Q1	8-729-313-82	TRANSISTOR 2SD1138	
Q2	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q3	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q4	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q5	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q6	8-729-300-13	TRANSISTOR 2SC2471	
Q7	8-729-110-53	TRANSISTOR 2SA1005-K	
Q8	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q9	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q10	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q11	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q12	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q13	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q14	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q15	8-729-119-78	TRANSISTOR 2SC2785-HFE	
		<RESISTOR>	
R1	1-249-414-11	CARBON 560 5% 1/4W	
R2	1-249-417-11	CARBON 1K 5% 1/4W	
R3	1-249-417-11	CARBON 1K 5% 1/4W	
R4	1-249-429-11	CARBON 10K 5% 1/4W	
R5	1-249-429-11	CARBON 10K 5% 1/4W	
R6	1-249-429-11	CARBON 10K 5% 1/4W	
R7	1-249-429-11	CARBON 10K 5% 1/4W	
R8	1-249-429-11	CARBON 10K 5% 1/4W	
R9	1-249-417-11	CARBON 1K 5% 1/4W	
R10	1-249-429-11	CARBON 10K 5% 1/4W	

Ref. No.	Part No.	Description	Remark
R11	1-249-429-11	CARBON 10K 5% 1/4W	
R12	1-249-429-11	CARBON 10K 5% 1/4W	
R13	1-249-429-11	CARBON 10K 5% 1/4W	
R14	1-249-429-11	CARBON 10K 5% 1/4W	
R15	1-249-405-11	CARBON 100 5% 1/4W	
R16	1-215-378-00	METAL 16 1% 1/6W	
R17	1-215-378-00	METAL 16 1% 1/6W	
R18	1-215-383-00	METAL 27 1% 1/6W	
R19	1-249-429-11	CARBON 10K 5% 1/4W	
R20	1-249-429-11	CARBON 10K 5% 1/4W	
R21	1-215-391-00	METAL 56 1% 1/6W	
R22	1-215-377-00	METAL 15 1% 1/6W	
R23	1-215-377-00	METAL 15 1% 1/6W	
R24	1-247-848-11	CARBON 5.1K 5% 1/4W	
R25	1-215-437-00	METAL 4.7K 1% 1/6W	
R26	1-215-405-00	METAL 220 1% 1/6W	
R27	1-215-428-00	METAL 2K 1% 1/6W	
R28	1-249-388-11	CARBON 3.9 5% 1/4W	
R29	1-249-429-11	CARBON 10K 5% 1/4W	
R30	1-247-804-11	CARBON 75 5% 1/4W	
R31	1-249-429-11	CARBON 10K 5% 1/4W	
R32	1-249-388-11	CARBON 3.9 5% 1/4W	
R33	1-249-429-11	CARBON 10K 5% 1/4W	
R34	1-215-441-00	METAL 6.8K 1% 1/6W	
R35	1-249-429-11	CARBON 10K 5% 1/4W	
R36	1-247-804-11	CARBON 75 5% 1/4W	
R37	1-249-388-11	CARBON 3.9 5% 1/4W	
R38	1-249-388-11	CARBON 3.9 5% 1/4W	
R39	1-249-411-11	CARBON 330 5% 1/4W	
R40	1-249-411-11	CARBON 330 5% 1/4W	
R41	1-249-435-11	CARBON 33K 5% 1/4W	
R42	1-249-405-11	CARBON 100 5% 1/4W	
R44	1-215-399-00	METAL 120 1% 1/6W	
R45	1-215-431-00	METAL 2.7K 1% 1/6W	
R46	1-215-455-00	METAL 27K 1% 1/6W	
R47	1-215-421-00	METAL 1K 1% 1/6W	
R48	1-215-441-00	METAL 6.8K 1% 1/6W	
R49	1-215-413-00	METAL 470 1% 1/6W	
R50	1-215-441-00	METAL 6.8K 1% 1/6W	
R51	1-215-421-00	METAL 1K 1% 1/6W	
R52	1-215-431-00	METAL 2.7K 1% 1/6W	
R53	1-215-415-00	METAL 560 1% 1/6W	
R54	1-215-433-00	METAL 3.3K 1% 1/6W	
R55	1-249-413-11	CARBON 470 5% 1/4W	
R56	1-215-427-00	METAL 1.8K 1% 1/6W	
R57	1-249-421-11	CARBON 2.2K 5% 1/4W	
R58	1-249-421-11	CARBON 2.2K 5% 1/4W	
R61	1-249-425-11	CARBON 4.7K 5% 1/4W	
		<RESISTOR BLOCK>	
RB1	1-231-407-00	RESISTOR BLOCK 2.2K	
RB2	1-231-407-00	RESISTOR BLOCK 2.2K	
		<VARIABLE RESISTOR>	
RV1	1-237-518-21	RES, ADJ, CERMET 10K	
		<CRYSTAL>	
X1	1-527-819-11	OSCILLATOR, CRYSTAL	

Ref. No.	Part No.	Description				Remark
**********						
	*A-1296-452-A	BF BOARD, COMPLETE				
		**********				
	*4-353-708-00	HOOK, FINGER				
		<CONNECTOR>				
BF1	*1-562-729-11	CONNECTOR, MULTI 64P				
	4-378-915-01	NUT (M2.6), PLATE; BF1				
		<CAPACITOR>				
C001	1-124-478-11	ELECT	100MF	20%	25V	
C002	1-101-004-00	CERAMIC	0.01MF		50V	
C003	1-124-478-11	ELECT	100MF	20%	25V	
C004	1-101-004-00	CERAMIC	0.01MF		50V	
C005	1-124-478-11	ELECT	100MF	20%	25V	
C006	1-124-478-11	ELECT	100MF	20%	25V	
C007	1-124-478-11	ELECT	100MF	20%	25V	
C008	1-101-004-00	CERAMIC	0.01MF		50V	
C009	1-124-478-11	ELECT	100MF	20%	25V	
C010	1-101-004-00	CERAMIC	0.01MF		50V	
C011	1-124-478-11	ELECT	100MF	20%	25V	
C012	1-101-004-00	CERAMIC	0.01MF		50V	
C013	1-101-004-00	CERAMIC	0.01MF		50V	
C014	1-101-004-00	CERAMIC	0.01MF		50V	
C015	1-101-004-00	CERAMIC	0.01MF		50V	
C017	1-101-004-00	CERAMIC	0.01MF		50V	
C019	1-101-004-00	CERAMIC	0.01MF		50V	
C020	1-101-004-00	CERAMIC	0.01MF		50V	
C101	1-124-477-11	ELECT	47MF	20%	25V	
C102	1-124-791-11	ELECT	1MF	20%	50V	
C103	1-124-477-11	ELECT	47MF	20%	25V	
C104	1-102-824-00	CERAMIC	470PF	5%	50V	
C105	1-102-824-00	CERAMIC	470PF	5%	50V	
C106	1-124-477-11	ELECT	47MF	20%	25V	
C107	1-124-477-11	ELECT	47MF	20%	25V	
C108	1-101-004-00	CERAMIC	0.01MF		50V	
C109	1-124-120-11	ELECT	220MF	20%	25V	
C111	1-124-925-11	ELECT	2.2MF	20%	50V	
C112	1-126-233-11	ELECT	22MF	20%	25V	
C113	1-124-477-11	ELECT	47MF	20%	25V	
C115	1-124-477-11	ELECT	47MF	20%	25V	
C116	1-108-792-11	MYLAR	0.001MF	5%	50V	
C117	1-101-004-00	CERAMIC	0.01MF		50V	
C118	1-102-973-00	CERAMIC	100PF	5%	50V	
C119	1-101-004-00	CERAMIC	0.01MF		50V	
C120	1-124-477-11	ELECT	47MF	20%	25V	
C121	1-124-791-11	ELECT	1MF	20%	50V	
C122	1-102-978-00	CERAMIC	220PF	5%	50V	
C123	1-101-004-00	CERAMIC	0.01MF		50V	
C124	1-102-820-00	CERAMIC	330PF	5%	50V	
C125	1-101-004-00	CERAMIC	0.01MF		50V	
C126	1-101-880-00	CERAMIC	47PF	5%	50V	
C127	1-101-880-00	CERAMIC	47PF	5%	50V	
C128	1-124-006-11	ELECT	10MF	20%	25V	
C129	1-102-959-00	CERAMIC	22PF	5%	50V	
C130	1-102-973-00	CERAMIC	100PF	5%	50V	
C131	1-102-824-00	CERAMIC	470PF	5%	50V	
C132	1-102-824-00	CERAMIC	470PF	5%	50V	
C133	1-101-361-00	CERAMIC	150PF	5%	50V	
C134	1-102-973-00	CERAMIC	100PF	5%	50V	
C135	1-101-004-00	CERAMIC	0.01MF		50V	
C136	1-101-004-00	CERAMIC	0.01MF		50V	
C137	1-101-004-00	CERAMIC	0.01MF		50V	
C138	1-101-004-00	CERAMIC	0.01MF		50V	
C139	1-101-004-00	CERAMIC	0.01MF		50V	
C140	1-101-004-00	CERAMIC	0.01MF		50V	
C141	1-124-477-11	ELECT	47MF	20%	25V	
C142	1-136-173-00	FILM	0.47MF	5%	50V	
C201	1-102-820-00	CERAMIC	330PF	5%	50V	
C203	1-102-961-00	CERAMIC	27PF	5%	50V	
C204	1-102-973-00	CERAMIC	100PF	5%	50V	
C205	1-101-888-00	CERAMIC	68PF	5%	50V	
C206	1-102-973-00	CERAMIC	100PF	5%	50V	
C207	1-136-153-00	FILM	0.01MF	5%	50V	
C208	1-123-875-11	ELECT	10MF	20%	50V	
C209	1-101-004-00	CERAMIC	0.01MF		50V	
C210	1-101-004-00	CERAMIC	0.01MF		50V	
C211	1-101-004-00	CERAMIC	0.01MF		50V	
C212	1-101-004-00	CERAMIC	0.01MF		50V	
C213	1-101-004-00	CERAMIC	0.01MF		50V	
C214	1-101-004-00	CERAMIC	0.01MF		50V	
C215	1-124-477-11	ELECT	47MF	20%	25V	
C216	1-124-477-11	ELECT	47MF	20%	25V	
C221	1-102-980-00	CERAMIC	270PF	5%	50V	
C222	1-101-361-00	CERAMIC	150PF	5%	50V	
C301	1-102-820-00	CERAMIC	330PF	5%	50V	
C302	1-101-004-00	CERAMIC	0.01MF		50V	
C303	1-101-880-00	CERAMIC	47PF	5%	50V	
C304	1-101-880-00	CERAMIC	47PF	5%	50V	
C305	1-124-006-11	ELECT	10MF	20%	25V	
C306	1-124-277-11	ELECT	4.7MF	20%	35V	
C307	1-108-796-11	MYLAR	0.0022MF	5%	50V	
C308	1-108-796-11	MYLAR	0.0022MF	5%	50V	
C309	1-136-169-00	FILM	0.22MF	5%	50V	
C310	1-136-153-00	FILM	0.01MF	5%	50V	
C311	1-101-004-00	CERAMIC	0.01MF		50V	
C312	1-101-004-00	CERAMIC	0.01MF		50V	
C314	1-124-477-11	ELECT	47MF	20%	25V	
C315	1-124-477-11	ELECT	47MF	20%	25V	
C316	1-124-478-11	ELECT	100MF	20%	25V	
C320	1-101-004-00	CERAMIC	0.01MF		50V	
C351	1-101-001-00	CERAMIC	0.001MF		50V	
		<DIODE>				
D002	8-719-911-19	DIODE 1SS119				
D004	8-719-911-19	DIODE 1SS119				
D005	8-719-911-19	DIODE 1SS119				
D006	8-719-911-19	DIODE 1SS119				
D007	8-719-911-19	DIODE 1SS119				
D008	8-719-911-19	DIODE 1SS119				
D009	8-719-911-19	DIODE 1SS119				
D011	8-719-911-19	DIODE 1SS119				
D101	8-719-911-19	DIODE 1SS119				
D102	8-719-911-19	DIODE 1SS119				
D103	8-719-911-19	DIODE 1SS119				
D104	8-719-911-19	DIODE 1SS119				
D105	8-719-911-19	DIODE 1SS119				
D106	8-719-911-19	DIODE 1SS119				
D107	8-719-911-19	DIODE 1SS119				

BF

Ref.No.	Part No.	Description	Remark
D108	8-719-911-19	DIODE 1SS119	
D110	8-719-109-89	DIODE RD5.6ES-B2	
D111	8-719-109-89	DIODE RD5.6ES-B2	
D112	8-719-109-89	DIODE RD5.6ES-B2	
D202	8-719-911-19	DIODE 1SS119	
D301	8-719-911-19	DIODE 1SS119	
D302	8-719-911-19	DIODE 1SS119	
D303	8-719-911-19	DIODE 1SS119	
D304	8-719-911-19	DIODE 1SS119	
		<IC>	
IC4	8-759-916-15	IC SN74HC05N	
IC002	8-759-982-21	IC RC78L05A	
IC101	8-759-040-53	IC MC14053BCP	
IC102	8-759-014-96	IC MC1496P	
IC103	8-759-038-14	IC MC74HC4538N	
IC104	8-759-038-14	IC MC74HC4538N	
IC105	8-759-921-17	IC SN74HC153N	
IC106	8-759-038-14	IC MC74HC4538N	
IC201	8-759-921-09	IC SN74HC36N	
IC202	8-759-000-99	IC MC74HC74N	
IC203	8-759-038-14	IC MC74HC4538N	
IC204	8-759-038-14	IC MC74HC4538N	
IC205	8-759-921-17	IC SN74HC153N	
IC206	8-759-038-14	IC MC74HC4538N	
IC301	8-759-921-17	IC SN74HC153N	
IC302	8-759-038-14	IC MC74HC4538N	
		<COIL>	
L001	1-408-429-00	INDUCTOR 470UH	
L002	1-408-429-00	INDUCTOR 470UH	
		<TRANSISTOR>	
Q002	8-729-900-80	TRANSISTOR DTC114ES	
Q101	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q102	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q103	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q104	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q105	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q106	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q108	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q109	8-729-105-88	TRANSISTOR 2SC2570A	
Q110	8-729-105-88	TRANSISTOR 2SC2570A	
Q111	8-729-697-92	TRANSISTOR 2SA979-G	
Q112	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q113	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q114	8-729-697-92	TRANSISTOR 2SA979-G	
Q115	8-729-697-92	TRANSISTOR 2SA979-G	
Q117	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q118	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q119	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q120	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q121	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q122	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q123	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q124	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q125	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q126	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q201	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q202	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q203	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q204	8-729-201-05	TRANSISTOR 2SC2878-B	
Q301	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q302	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q303	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q304	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q305	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q306	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q307	8-729-119-78	TRANSISTOR 2SC2785-HFE	
		<RESISTOR>	
R001	1-249-441-11	CARBON 100K 5% 1/4W	
R002	1-249-441-11	CARBON 100K 5% 1/4W	
R003	1-249-441-11	CARBON 100K 5% 1/4W	
R006	1-249-441-11	CARBON 100K 5% 1/4W	
R008	1-249-417-11	CARBON 1K 5% 1/4W	
R009	1-249-441-11	CARBON 100K 5% 1/4W	
R010	1-249-437-11	CARBON 47K 5% 1/4W	
R011	1-249-437-11	CARBON 47K 5% 1/4W	
R012	1-249-437-11	CARBON 47K 5% 1/4W	
R013	1-249-437-11	CARBON 47K 5% 1/4W	
R015	1-249-437-11	CARBON 47K 5% 1/4W	
R016	1-249-405-11	CARBON 100 5% 1/4W	
R017	1-249-405-11	CARBON 100 5% 1/4W	
R019	1-249-405-11	CARBON 100 5% 1/4W	
R020	1-249-437-11	CARBON 47K 5% 1/4W	
R021	1-249-437-11	CARBON 47K 5% 1/4W	
R022	1-249-437-11	CARBON 47K 5% 1/4W	
R023	1-249-437-11	CARBON 47K 5% 1/4W	
R024	1-249-437-11	CARBON 47K 5% 1/4W	
R101	1-249-410-11	CARBON 270 5% 1/4W	
R102	1-215-469-00	METAL 100K 1% 1/6W	
R103	1-249-405-11	CARBON 100 5% 1/4W	
R104	1-215-464-00	METAL 62K 1% 1/6W	
R105	1-249-405-11	CARBON 100 5% 1/4W	
R106	1-249-426-11	CARBON 5.6K 5% 1/4W	
R107	1-249-411-11	CARBON 330 5% 1/4W	
R108	1-215-469-00	METAL 100K 1% 1/6W	
R109	1-249-405-11	CARBON 100 5% 1/4W	
R110	1-215-464-00	METAL 62K 1% 1/6W	
R111	1-249-405-11	CARBON 100 5% 1/4W	
R112	1-249-426-11	CARBON 5.6K 5% 1/4W	
R113	1-249-425-11	CARBON 4.7K 5% 1/4W	
R114	1-215-469-00	METAL 100K 1% 1/6W	
R115	1-249-405-11	CARBON 100 5% 1/4W	
R116	1-215-464-00	METAL 62K 1% 1/6W	
R117	1-249-405-11	CARBON 100 5% 1/4W	
R118	1-249-426-11	CARBON 5.6K 5% 1/4W	
R119	1-249-399-11	CARBON 33 5% 1/4W	
R120	1-249-399-11	CARBON 33 5% 1/4W	
R121	1-249-428-11	CARBON 8.2K 5% 1/4W	
R122	1-249-429-11	CARBON 10K 5% 1/4W	
R123	1-249-427-11	CARBON 6.8K 5% 1/4W	
R124	1-249-405-11	CARBON 100 5% 1/4W	
R125	1-249-401-11	CARBON 47 5% 1/4W	
R126	1-249-401-11	CARBON 47 5% 1/4W	
R127	1-215-397-00	METAL 100 1% 1/6W	
R128	1-215-405-00	METAL 220 1% 1/6W	
R129	1-215-423-00	METAL 1.2K 1% 1/6W	

Ref. No.	Part No.	Description				Remark
R130	1-215-435-00	METAL	3.9K	1%	1/6W	
R131	1-215-469-00	METAL	100K	1%	1/6W	
R132	1-215-441-00	METAL	6.8K	1%	1/6W	
R133	1-215-443-00	METAL	8.2K	1%	1/6W	
R134	1-249-427-11	CARBON	6.8K	5%	1/4W	
R135	1-249-405-11	CARBON	100	5%	1/4W	
R136	1-215-445-00	METAL	10K	1%	1/6W	
R137	1-215-415-00	METAL	560	1%	1/6W	
R138	1-215-443-00	METAL	8.2K	1%	1/6W	
R139	1-215-419-00	METAL	820	1%	1/6W	
R140	1-215-443-00	METAL	8.2K	1%	1/6W	
R141	1-215-433-00	METAL	3.3K	1%	1/6W	
R142	1-249-415-11	CARBON	680	5%	1/4W	
R143	1-215-427-00	METAL	1.8K	1%	1/6W	
R144	1-249-401-11	CARBON	47	5%	1/4W	
R145	1-249-421-11	CARBON	2.2K	5%	1/4W	
R146	1-249-431-11	CARBON	15K	5%	1/4W	
R147	1-215-435-00	METAL	3.9K	1%	1/6W	
R148	1-249-425-11	CARBON	4.7K	5%	1/4W	
R149	1-249-437-11	CARBON	47K	5%	1/4W	
R150	1-247-881-00	CARBON	120K	5%	1/4W	
R151	1-247-895-00	CARBON	470K	5%	1/4W	
R152	1-249-416-11	CARBON	820	5%	1/4W	
R153	1-215-411-00	METAL	390	1%	1/6W	
R154	1-249-418-11	CARBON	1.2K	5%	1/4W	
R155	1-215-441-00	METAL	6.8K	1%	1/6W	
R156	1-215-413-00	METAL	470	1%	1/6W	
R157	1-249-425-11	CARBON	4.7K	5%	1/4W	
R158	1-247-887-00	CARBON	220K	5%	1/4W	
R159	1-249-423-11	CARBON	3.3K	5%	1/4W	
R160	1-249-421-11	CARBON	2.2K	5%	1/4W	
R161	1-249-419-11	CARBON	1.5K	5%	1/4W	
R162	1-249-421-11	CARBON	2.2K	5%	1/4W	
R163	1-249-421-11	CARBON	2.2K	5%	1/4W	
R164	1-249-405-11	CARBON	100	5%	1/4W	
R165	1-249-405-11	CARBON	100	5%	1/4W	
R166	1-249-429-11	CARBON	10K	5%	1/4W	
R167	1-249-405-11	CARBON	100	5%	1/4W	
R168	1-249-425-11	CARBON	4.7K	5%	1/4W	
R169	1-249-405-11	CARBON	100	5%	1/4W	
R170	1-249-405-11	CARBON	100	5%	1/4W	
R171	1-249-414-11	CARBON	560	5%	1/4W	
R172	1-249-414-11	CARBON	560	5%	1/4W	
R173	1-249-430-11	CARBON	12K	5%	1/4W	
R174	1-249-405-11	CARBON	100	5%	1/4W	
R175	1-249-429-11	CARBON	10K	5%	1/4W	
R176	1-249-429-11	CARBON	10K	5%	1/4W	
R177	1-247-889-00	CARBON	270K	5%	1/4W	
R178	1-249-423-11	CARBON	3.3K	5%	1/4W	
R179	1-215-421-00	METAL	1K	1%	1/6W	
R180	1-215-441-00	METAL	6.8K	1%	1/6W	
R181	1-215-469-00	METAL	100K	1%	1/6W	
R182	1-215-460-00	METAL	43K	1%	1/6W	
R183	1-215-468-00	METAL	91K	1%	1/6W	
R184	1-215-441-00	METAL	6.8K	1%	1/6W	
R185	1-249-416-11	CARBON	820	5%	1/4W	
R187	1-249-417-11	CARBON	1K	5%	1/4W	
R188	1-249-393-11	CARBON	10	5%	1/4W	
R189	1-249-405-11	CARBON	100	5%	1/4W	
R190	1-249-405-11	CARBON	100	5%	1/4W	
R201	1-249-417-11	CARBON	1K	5%	1/4W	
R202	1-249-421-11	CARBON	2.2K	5%	1/4W	
R203	1-249-417-11	CARBON	1K	5%	1/4W	
R204	1-249-393-11	CARBON	10	5%	1/4W	
R205	1-249-417-11	CARBON	1K	5%	1/4W	
R206	1-249-405-11	CARBON	100	5%	1/4W	
R207	1-215-421-00	METAL	1K	1%	1/6W	
R208	1-215-421-00	METAL	1K	1%	1/6W	
R209	1-215-421-00	METAL	1K	1%	1/6W	
R210	1-215-437-00	METAL	4.7K	1%	1/6W	
R211	1-215-459-00	METAL	39K	1%	1/6W	
R212	1-249-429-11	CARBON	10K	5%	1/4W	
R213	1-249-425-11	CARBON	4.7K	5%	1/4W	
R214	1-249-429-11	CARBON	10K	5%	1/4W	
R221	1-249-414-11	CARBON	560	5%	1/4W	
R222	1-249-414-11	CARBON	560	5%	1/4W	
R301	1-249-421-11	CARBON	2.2K	5%	1/4W	
R302	1-249-421-11	CARBON	2.2K	5%	1/4W	
R303	1-249-405-11	CARBON	100	5%	1/4W	
R304	1-249-405-11	CARBON	100	5%	1/4W	
R305	1-249-429-11	CARBON	10K	5%	1/4W	
R306	1-249-405-11	CARBON	100	5%	1/4W	
R307	1-249-425-11	CARBON	4.7K	5%	1/4W	
R308	1-249-405-11	CARBON	100	5%	1/4W	
R309	1-249-405-11	CARBON	100	5%	1/4W	
R310	1-249-430-11	CARBON	12K	5%	1/4W	
R311	1-249-417-11	CARBON	1K	5%	1/4W	
R312	1-249-417-11	CARBON	1K	5%	1/4W	
R313	1-249-405-11	CARBON	100	5%	1/4W	
R314	1-249-429-11	CARBON	10K	5%	1/4W	
R315	1-249-429-11	CARBON	10K	5%	1/4W	
R316	1-247-889-00	CARBON	270K	5%	1/4W	
R317	1-249-423-11	CARBON	3.3K	5%	1/4W	
R318	1-249-405-11	CARBON	100	5%	1/4W	
R319	1-249-437-11	CARBON	47K	5%	1/4W	
R320	1-249-429-11	CARBON	10K	5%	1/4W	
R321	1-215-433-00	METAL	3.3K	1%	1/6W	
R322	1-215-433-00	METAL	3.3K	1%	1/6W	
R323	1-249-423-11	CARBON	3.3K	5%	1/4W	
R324	1-215-460-00	METAL	43K	1%	1/6W	
R325	1-215-450-00	METAL	16K	1%	1/6W	
R326	1-249-417-11	CARBON	1K	5%	1/4W	

<VARIABLE RESISTOR>

RV101	1-237-520-21	RES, ADJ, CERMET 50K	
RV102	1-237-520-21	RES, ADJ, CERMET 50K	
RV201	1-237-520-21	RES, ADJ, CERMET 50K	
RV202	1-237-518-21	RES, ADJ, CERMET 10K	
RV203	1-237-518-21	RES, ADJ, CERMET 10K	
RV204	1-237-517-21	RES, ADJ, CERMET 5K	
RV301	1-237-519-21	RES, ADJ, CERMET 20K	

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*A-1296-453-A	BG BOARD, COMPLETE	
	**********	
*4-353-708-00	HOOK, FINGER	

<CONNECTOR>

BG1	*1-562-729-11	CONNECTOR, MULTI 64P	
	4-378-915-01	NUT (M2.6), PLATE; BG1	

BG

Ref. No.	Part No.	Description				Remark
		<CAPACITOR>				
C1	1-124-477-11	ELECT	47MF	20%	25V	
C2	1-101-004-00	CERAMIC	0.01MF		50V	
C3	1-124-589-11	ELECT	47MF	20%	16V	
C4	1-101-004-00	CERAMIC	0.01MF		50V	
C5	1-124-120-11	ELECT	220MF	20%	25V	
C6	1-124-589-11	ELECT	47MF	20%	16V	
C7	1-101-004-00	CERAMIC	0.01MF		50V	
C8	1-124-120-11	ELECT	220MF	20%	25V	
C9	1-124-477-11	ELECT	47MF	20%	25V	
C10	1-101-004-00	CERAMIC	0.01MF		50V	
C11	1-124-477-11	ELECT	47MF	20%	25V	
C12	1-101-004-00	CERAMIC	0.01MF		50V	
C13	1-124-120-11	ELECT	220MF	20%	25V	
C100	1-136-165-00	FILM	0.1MF	5%	50V	
C101	1-124-589-11	ELECT	47MF	20%	16V	
C102	1-101-004-00	CERAMIC	0.01MF		50V	
C103	1-101-004-00	CERAMIC	0.01MF		50V	
C104	1-101-004-00	CERAMIC	0.01MF		50V	
C105	1-101-004-00	CERAMIC	0.01MF		50V	
C106	1-101-004-00	CERAMIC	0.01MF		50V	
C107	1-101-004-00	CERAMIC	0.01MF		50V	
C108	1-101-004-00	CERAMIC	0.01MF		50V	
C109	1-124-589-11	ELECT	47MF	20%	16V	
C110	1-101-004-00	CERAMIC	0.01MF		50V	
C111	1-101-004-00	CERAMIC	0.01MF		50V	
C112	1-101-004-00	CERAMIC	0.01MF		50V	
C113	1-101-004-00	CERAMIC	0.01MF		50V	
C114	1-123-875-11	ELECT	10MF	20%	50V	
C115	1-124-261-00	ELECT	10MF	20%	50V	
C116	1-101-004-00	CERAMIC	0.01MF		50V	
C119	1-124-477-11	ELECT	47MF	20%	25V	
C120	1-101-004-00	CERAMIC	0.01MF		50V	
C121	1-124-477-11	ELECT	47MF	20%	25V	
C122	1-101-004-00	CERAMIC	0.01MF		50V	
C123	1-101-004-00	CERAMIC	0.01MF		50V	
C124	1-136-161-00	FILM	0.047MF	5%	50V	
C125	1-123-875-11	ELECT	10MF	20%	50V	
C126	1-136-161-00	FILM	0.047MF	5%	50V	
C127	1-101-004-00	CERAMIC	0.01MF		50V	
C128	1-101-004-00	CERAMIC	0.01MF		50V	
C129	1-101-004-00	CERAMIC	0.01MF		50V	
C130	1-101-004-00	CERAMIC	0.01MF		50V	
C131	1-101-004-00	CERAMIC	0.01MF		50V	
C132	1-101-004-00	CERAMIC	0.01MF		50V	
C133	1-102-824-00	CERAMIC	470PF	5%	50V	
C200	1-124-477-11	ELECT	47MF	20%	25V	
C201	1-101-004-00	CERAMIC	0.01MF		50V	
C202	1-102-959-00	CERAMIC	22PF	5%	50V	
C203	1-102-973-00	CERAMIC	100PF	5%	50V	
C204	1-102-973-00	CERAMIC	100PF	5%	50V	
C205	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C206	1-101-004-00	CERAMIC	0.01MF		50V	
C207	1-101-004-00	CERAMIC	0.01MF		50V	
C208	1-101-004-00	CERAMIC	0.01MF		50V	
C209	1-102-959-00	CERAMIC	22PF	5%	50V	
C210	1-102-973-00	CERAMIC	100PF	5%	50V	
C211	1-101-004-00	CERAMIC	0.01MF		50V	
C212	1-102-959-00	CERAMIC	22PF	5%	50V	
C213	1-102-959-00	CERAMIC	22PF	5%	50V	
C214	1-101-004-00	CERAMIC	0.01MF		50V	
C215	1-102-973-00	CERAMIC	100PF	5%	50V	
C216	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C217	1-101-004-00	CERAMIC	0.01MF		50V	
C218	1-101-004-00	CERAMIC	0.01MF		50V	
C219	1-124-443-00	ELECT	100MF	20%	10V	
C220	1-101-004-00	CERAMIC	0.01MF		50V	
C221	1-124-478-11	ELECT	100MF	20%	25V	
C222	1-101-004-00	CERAMIC	0.01MF		50V	
C223	1-124-477-11	ELECT	47MF	20%	25V	
C301	1-101-004-00	CERAMIC	0.01MF		50V	
C302	1-102-824-00	CERAMIC	470PF	5%	50V	
C303	1-102-959-00	CERAMIC	22PF	5%	50V	
C305	1-101-004-00	CERAMIC	0.01MF		50V	
C306	1-101-004-00	CERAMIC	0.01MF		50V	
C307	1-101-004-00	CERAMIC	0.01MF		50V	
C308	1-101-004-00	CERAMIC	0.01MF		50V	
C309	1-102-973-00	CERAMIC	100PF	5%	50V	
C310	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C311	1-101-004-00	CERAMIC	0.01MF		50V	
C312	1-101-004-00	CERAMIC	0.01MF		50V	
C313	1-102-973-00	CERAMIC	100PF	5%	50V	
C314	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C315	1-101-004-00	CERAMIC	0.01MF		50V	
C316	1-101-004-00	CERAMIC	0.01MF		50V	
C317	1-101-004-00	CERAMIC	0.01MF		50V	
C318	1-101-361-00	CERAMIC	150PF	5%	50V	
C319	1-101-361-00	CERAMIC	150PF	5%	50V	
C320	1-102-973-00	CERAMIC	100PF	5%	50V	
C321	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C322	1-123-875-11	ELECT	10MF	20%	50V	
C323	1-101-004-00	CERAMIC	0.01MF		50V	
C324	1-101-004-00	CERAMIC	0.01MF		50V	
C325	1-102-973-00	CERAMIC	100PF	5%	50V	
C326	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C327	1-101-004-00	CERAMIC	0.01MF		50V	
C328	1-101-004-00	CERAMIC	0.01MF		50V	
C329	1-124-443-00	ELECT	100MF	20%	10V	
C330	1-101-004-00	CERAMIC	0.01MF		50V	
C331	1-124-478-11	ELECT	100MF	20%	25V	
C332	1-101-004-00	CERAMIC	0.01MF		50V	
C333	1-124-443-00	ELECT	100MF	20%	10V	
C334	1-101-004-00	CERAMIC	0.01MF		50V	
C335	1-124-477-11	ELECT	47MF	20%	25V	
C336	1-101-004-00	CERAMIC	0.01MF		50V	
C337	1-124-791-11	ELECT	1MF	20%	50V	
C338	1-123-875-11	ELECT	10MF	20%	50V	
		<DIODE>				
D1	8-719-911-19	DIODE 1SS119				
D101	8-719-911-19	DIODE 1SS119				
D201	8-719-110-08	DIODE RD8.2ESB2				
D202	8-719-911-19	DIODE 1SS119				
D203	8-719-110-08	DIODE RD8.2ESB2				
D204	8-719-911-19	DIODE 1SS119				
D301	8-719-110-08	DIODE RD8.2ESB2				
D302	8-719-911-19	DIODE 1SS119				
D303	8-719-110-08	DIODE RD8.2ESB2				
D304	8-719-911-19	DIODE 1SS119				
D305	8-719-110-08	DIODE RD8.2ESB2				
D306	8-719-911-19	DIODE 1SS119				

Ref. No.	Part No.	Description	Remark
D307	8-719-110-08	DIODE RD8.2ESB2	
D308	8-719-911-19	DIODE 1SS119	
D309	8-719-911-19	DIODE 1SS119	
		<IC>	
IC1	8-759-924-12	IC LM7805CT	
IC101	8-759-014-95	IC MC1495L	
IC102	8-759-990-82	IC TL082CP	
IC103	8-759-990-82	IC TL082CP	
IC104	8-759-140-53	IC MC14053BCP	
IC105	8-759-007-21	IC MC74HC4053N	
IC201	8-759-038-14	IC MC74HC4538N	
IC202	8-759-038-14	IC MC74HC4538N	
IC203	8-759-038-14	IC MC74HC4538N	
IC204	8-759-001-26	IC MC74HC112N	
IC301	8-759-038-14	IC MC74HC4538N	
IC302	8-759-917-11	IC SN74HC393N	
IC303	8-759-032-84	IC MC74HC132AN	
IC304	8-759-916-59	IC SN74HC193N	
IC305	8-759-916-59	IC SN74HC193N	
IC306	8-759-038-14	IC MC74HC4538N	
IC307	8-759-032-84	IC MC74HC132AN	
IC308	8-759-001-26	IC MC74HC112N	
		<COIL>	
L1	1-408-429-00	INDUCTOR 470UH	
L2	1-408-429-00	INDUCTOR 470UH	
L3	1-408-429-00	INDUCTOR 470UH	
		<TRANSISTOR>	
Q101	8-729-201-05	TRANSISTOR 2SC2878-B	
Q102	8-729-201-05	TRANSISTOR 2SC2878-B	
Q103	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q104	8-729-201-05	TRANSISTOR 2SC2878-B	
Q105	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q106	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q107	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q110	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q111	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q112	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q113	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q114	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q115	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q116	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q117	8-729-802-45	TRANSISTOR 2SK125-5	
Q118	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q200	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q201	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q202	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q203	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q204	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q205	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q206	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q207	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q208	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q300	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q301	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q302	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q303	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q304	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q305	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q306	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q307	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q308	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q309	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q310	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q311	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q312	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q313	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q314	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q315	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q316	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q317	8-729-900-36	TRANSISTOR DTC124ES	
Q318	8-729-900-36	TRANSISTOR DTC124ES	
Q319	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q320	8-729-119-76	TRANSISTOR 2SA1175-HFE	
		<RESISTOR>	
R100	1-249-405-11	CARBON 100 5% 1/4W	
R102	1-249-405-11	CARBON 100 5% 1/4W	
R103	1-215-449-00	METAL 15K 1% 1/6W	
R104	1-215-429-00	METAL 2.2K 1% 1/6W	
R105	1-215-449-00	METAL 15K 1% 1/6W	
R106	1-215-429-00	METAL 2.2K 1% 1/6W	
R107	1-215-449-00	METAL 15K 1% 1/6W	
R108	1-215-444-00	METAL 9.1K 1% 1/6W	
R109	1-215-444-00	METAL 9.1K 1% 1/6W	
R110	1-215-413-00	METAL 470 1% 1/6W	
R111	1-249-435-11	CARBON 33K 5% 1/4W	
R112	1-215-433-00	METAL 3.3K 1% 1/6W	
R113	1-215-433-00	METAL 3.3K 1% 1/6W	
R114	1-215-445-00	METAL 10K 1% 1/6W	
R115	1-215-416-00	METAL 620 1% 1/6W	
R116	1-215-445-00	METAL 10K 1% 1/6W	
R117	1-215-447-00	METAL 12K 1% 1/6W	
R118	1-215-417-00	METAL 680 1% 1/6W	
R119	1-215-445-00	METAL 10K 1% 1/6W	
R120	1-215-435-00	METAL 3.9K 1% 1/6W	
R121	1-249-435-11	CARBON 33K 5% 1/4W	
R122	1-249-435-11	CARBON 33K 5% 1/4W	
R123	1-249-435-11	CARBON 33K 5% 1/4W	
R124	1-249-429-11	CARBON 10K 5% 1/4W	
R125	1-249-435-11	CARBON 33K 5% 1/4W	
R126	1-215-443-00	METAL 8.2K 1% 1/6W	
R127	1-215-445-00	METAL 10K 1% 1/6W	
R128	1-215-419-00	METAL 820 1% 1/6W	
R129	1-215-435-00	METAL 3.9K 1% 1/6W	
R130	1-215-437-00	METAL 4.7K 1% 1/6W	
R131	1-215-437-00	METAL 4.7K 1% 1/6W	
R132	1-249-422-11	CARBON 2.7K 5% 1/4W	
R133	1-215-401-11	METAL 150 1% 1/6W	
R134	1-215-401-11	METAL 150 1% 1/6W	
R135	1-215-445-00	METAL 10K 1% 1/6W	
R136	1-215-445-00	METAL 10K 1% 1/6W	
R137	1-215-425-00	METAL 1.5K 1% 1/6W	
R138	1-215-446-00	METAL 11K 1% 1/6W	
R139	1-215-425-00	METAL 1.5K 1% 1/6W	
R140	1-215-447-00	METAL 12K 1% 1/6W	
R144	1-215-417-00	METAL 680 1% 1/6W	
R145	1-215-427-00	METAL 1.8K 1% 1/6W	

BG | GA

Ref. No.	Part No.	Description				Remark
R146	1-215-439-00	METAL	5.6K	1%	1/6W	
R147	1-215-439-00	METAL	5.6K	1%	1/6W	
R148	1-249-403-11	CARBON	68	5%	1/4W	
R150	1-215-427-00	METAL	1.8K	1%	1/6W	
R151	1-215-439-00	METAL	5.6K	1%	1/6W	
R152	1-215-439-00	METAL	5.6K	1%	1/6W	
R153	1-249-403-11	CARBON	68	5%	1/4W	
R154	1-215-419-00	METAL	820	1%	1/6W	
R155	1-215-416-00	METAL	620	1%	1/6W	
R156	1-249-417-11	CARBON	1K	5%	1/4W	
R157	1-249-399-11	CARBON	33	5%	1/4W	
R158	1-249-419-11	CARBON	1.5K	5%	1/4W	
R159	1-249-393-11	CARBON	10	5%	1/4W	
R160	1-249-405-11	CARBON	100	5%	1/4W	
R161	1-215-445-00	METAL	10K	1%	1/6W	
R162	1-215-416-00	METAL	620	1%	1/6W	
R163	1-249-429-11	CARBON	10K	5%	1/4W	
R164	1-249-417-11	CARBON	1K	5%	1/4W	
R165	1-249-405-11	CARBON	100	5%	1/4W	
R166	1-249-441-11	CARBON	100K	5%	1/4W	
R167	1-247-903-00	CARBON	1M	5%	1/4W	
R168	1-215-420-00	METAL	910	1%	1/6W	
R169	1-215-445-00	METAL	10K	1%	1/6W	
R170	1-215-436-00	METAL	4.3K	1%	1/6W	
R173	1-249-429-11	CARBON	10K	5%	1/4W	
R174	1-249-405-11	CARBON	100	5%	1/4W	
R175	1-249-405-11	CARBON	100	5%	1/4W	
R176	1-215-487-00	METAL	560K	1%	1/6W	
R201	1-249-427-11	CARBON	6.8K	5%	1/4W	
R202	1-249-423-11	CARBON	3.3K	5%	1/4W	
R203	1-249-430-11	CARBON	12K	5%	1/4W	
R204	1-215-426-00	METAL	1.6K	1%	1/6W	
R205	1-215-433-00	METAL	3.3K	1%	1/6W	
R206	1-249-421-11	CARBON	2.2K	5%	1/4W	
R207	1-249-425-11	CARBON	4.7K	5%	1/4W	
R208	1-249-425-11	CARBON	4.7K	5%	1/4W	
R209	1-249-417-11	CARBON	1K	5%	1/4W	
R210	1-249-429-11	CARBON	10K	5%	1/4W	
R211	1-249-405-11	CARBON	100	5%	1/4W	
R212	1-215-421-00	METAL	1K	1%	1/6W	
R213	1-215-433-00	METAL	3.3K	1%	1/6W	
R214	1-215-421-00	METAL	1K	1%	1/6W	
R215	1-215-421-00	METAL	1K	1%	1/6W	
R216	1-249-421-11	CARBON	2.2K	5%	1/4W	
R217	1-249-425-11	CARBON	4.7K	5%	1/4W	
R218	1-249-425-11	CARBON	4.7K	5%	1/4W	
R219	1-249-417-11	CARBON	1K	5%	1/4W	
R220	1-249-429-11	CARBON	10K	5%	1/4W	
R221	1-249-405-11	CARBON	100	5%	1/4W	
R222	1-249-426-11	CARBON	5.6K	5%	1/4W	
R223	1-249-425-11	CARBON	4.7K	5%	1/4W	
R301	1-249-427-11	CARBON	6.8K	5%	1/4W	
R302	1-249-423-11	CARBON	3.3K	5%	1/4W	
R303	1-249-430-11	CARBON	12K	5%	1/4W	
R304	1-215-468-00	METAL	91K	1%	1/6W	
R305	1-215-421-00	METAL	1K	1%	1/6W	
R309	1-249-421-11	CARBON	2.2K	5%	1/4W	
R310	1-249-425-11	CARBON	4.7K	5%	1/4W	
R311	1-249-425-11	CARBON	4.7K	5%	1/4W	
R312	1-249-417-11	CARBON	1K	5%	1/4W	
R313	1-249-429-11	CARBON	10K	5%	1/4W	
R314	1-249-405-11	CARBON	100	5%	1/4W	
R315	1-249-421-11	CARBON	2.2K	5%	1/4W	
R316	1-249-425-11	CARBON	4.7K	5%	1/4W	
R317	1-249-425-11	CARBON	4.7K	5%	1/4W	
R318	1-249-417-11	CARBON	1K	5%	1/4W	
R319	1-249-429-11	CARBON	10K	5%	1/4W	
R320	1-249-405-11	CARBON	100	5%	1/4W	
R321	1-215-461-00	METAL	47K	1%	1/6W	
R322	1-215-467-00	METAL	82K	1%	1/6W	
R323	1-249-421-11	CARBON	2.2K	5%	1/4W	
R324	1-249-425-11	CARBON	4.7K	5%	1/4W	
R325	1-249-425-11	CARBON	4.7K	5%	1/4W	
R326	1-249-417-11	CARBON	1K	5%	1/4W	
R327	1-249-429-11	CARBON	10K	5%	1/4W	
R328	1-249-405-11	CARBON	100	5%	1/4W	
R329	1-249-421-11	CARBON	2.2K	5%	1/4W	
R330	1-249-425-11	CARBON	4.7K	5%	1/4W	
R331	1-249-425-11	CARBON	4.7K	5%	1/4W	
R332	1-249-417-11	CARBON	1K	5%	1/4W	
R333	1-249-429-11	CARBON	10K	5%	1/4W	
R334	1-249-405-11	CARBON	100	5%	1/4W	
R335	1-249-426-11	CARBON	5.6K	5%	1/4W	
R336	1-249-421-11	CARBON	2.2K	5%	1/4W	
R337	1-249-405-11	CARBON	100	5%	1/4W	
R338	1-249-405-11	CARBON	100	5%	1/4W	
R339	1-249-405-11	CARBON	100	5%	1/4W	
R340	1-249-441-11	CARBON	100K	5%	1/4W	

<VARIABLE RESISTOR>

RV101	1-237-516-21	RES, ADJ, CERMET	2K		
RV102	1-237-519-21	RES, ADJ, CERMET	20K		
RV103	1-237-519-21	RES, ADJ, CERMET	20K		
RV201	1-237-517-21	RES, ADJ, CERMET	5K		
RV202	1-237-517-21	RES, ADJ, CERMET	5K		

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	*1-626-504-11	GA BOARD			
		********			
	2-832-007-00	BUSHING (K), INSULATING			
	*4-363-404-00	HOLDER, IC			
	4-363-414-00	SPACER, MICA			

<CAPACITOR>

C1	1-124-046-00	ELECT	10MF	20%	160V
C2	1-124-510-11	ELECT	220MF	20%	25V
C3	1-124-510-11	ELECT	220MF	20%	25V
C4	1-124-510-11	ELECT	220MF	20%	25V
C5	1-124-510-11	ELECT	220MF	20%	25V
C6	1-124-046-00	ELECT	10MF	20%	160V
C7	1-124-510-11	ELECT	220MF	20%	25V
C8	1-124-510-11	ELECT	220MF	20%	25V
C9	1-124-510-11	ELECT	220MF	20%	25V
C10	1-124-510-11	ELECT	220MF	20%	25V
C11	1-124-122-11	ELECT	100MF	20%	25V
C12	1-126-103-11	ELECT	470MF	20%	16V
C13	1-124-510-11	ELECT	220MF	20%	25V
C14	1-124-510-11	ELECT	220MF	20%	25V
C16	1-130-483-00	MYLAR	0.01MF	5%	50V
C17	1-124-046-00	ELECT	10MF	20%	160V

Ref. No.	Part No.	Description	Remark
		<DIODE>	
D1	8-719-971-20	DIODE ERC38-06	
D2	8-719-971-20	DIODE ERC38-06	
D3	8-719-911-19	DIODE 1SS119	
		<CONNECTOR>	
GA1	*1-560-127-00	PLUG, CONNECTOR (2.5MM) 7P	
GA3	*1-566-054-11	PIN, CONNECTOR 2P	
GA4	*1-566-055-11	PIN, CONNECTOR 3P	
GA5	*1-566-057-11	PIN, CONNECTOR 5P	
GA6	*1-566-059-11	PIN, CONNECTOR 7P	
GA7	*1-566-055-11	PIN, CONNECTOR 3P	
GA8	*1-566-056-11	PIN, CONNECTOR 4P	
GA9	*1-566-054-11	PIN, CONNECTOR 2P	
GA10	*1-566-054-11	PIN, CONNECTOR 2P	
GA11	*1-566-054-11	PIN, CONNECTOR 2P	
GA12	*1-566-058-11	PIN, CONNECTOR 6P	
GA13	*1-508-768-00	PIN, CONNECTOR (5MM PITCH) 6P	
GA14	*1-566-054-11	PIN, CONNECTOR 2P	
GA15	*1-566-058-11	PIN, CONNECTOR 6P	
GA16	*1-566-058-11	PIN, CONNECTOR 6P	
GA17	*1-566-055-11	PIN, CONNECTOR 3P	
GA18	*1-566-057-11	PIN, CONNECTOR 5P	
GA19	*1-566-060-11	PIN, CONNECTOR 8P	
		<IC>	
IC1	8-759-929-62	IC LM7812CT	
IC2	8-759-929-65	IC LM7912CT	
IC3	8-759-929-62	IC LM7812CT	
IC4	8-759-929-65	IC LM7912CT	
		<TRANSISTOR>	
Q1	8-729-900-36	TRANSISTOR DTC124ES	
Q2	8-729-900-63	TRANSISTOR DTA124ES	
Q3	8-729-304-26	TRANSISTOR 2SC3263-O	
Q4	8-729-140-50	TRANSISTOR 2SC3209-LK	
		<RESISTOR>	
R1	1-249-425-11	CARBON 4.7K 5% 1/4W	
R2	1-249-405-11	CARBON 100 5% 1/4W	
R3	1-249-417-11	CARBON 1K 5% 1/4W	
R7	1-249-417-11	CARBON 1K 5% 1/4W	
R8	1-215-875-11	METAL OXIDE 10K 5% 1W F	
R9	1-215-902-11	METAL OXIDE 47K 5% 1W F	
R10	1-207-959-00	WIREWOUND 10 10% 7W F	
**********			
	*1-617-465-11	CB BOARD	
		********	
	1-526-767-00	SOCKET, CRT	
	1-556-880-81	LEAD ASSY, HIGH-VOLTAGE	
		<CAPACITOR>	
C1	1-102-316-00	CERAMIC 15PF 5% 500V	
C2	1-102-316-00	CERAMIC 15PF 5% 500V	
C3	1-102-316-00	CERAMIC 15PF 5% 500V	
C4	1-162-114-00	CERAMIC 0.0047MF 10% 2KV	

Ref. No.	Part No.	Description	Remark
		<CONNECTOR>	
CB1	*1-508-786-00	PIN, CONNECTOR (5MM PITCH) 2P	
CB2	*1-508-784-00	PIN, CONNECTOR (5MM PITCH) 1P	
CB4	*1-566-056-11	PIN, CONNECTOR 4P	
CB5	*1-566-056-11	PIN, CONNECTOR 4P	
CB6	*1-566-056-11	PIN, CONNECTOR 4P	
CB7	*1-566-055-11	PIN, CONNECTOR 3P	
CB8	*1-566-054-11	PIN, CONNECTOR 2P	
		<COIL>	
L1	1-408-108-00	INDUCTOR 1.8UH	
L2	1-408-108-00	INDUCTOR 1.8UH	
L3	1-408-108-00	INDUCTOR 1.8UH	
		<NEON LAMP>	
NL1	1-519-013-13	DISCHARGE TUBE	
NL2	1-519-013-13	DISCHARGE TUBE	
NL3	1-519-013-13	DISCHARGE TUBE	
NL4	1-519-013-13	DISCHARGE TUBE	
NL5	1-519-013-13	DISCHARGE TUBE	
NL6	1-519-013-13	DISCHARGE TUBE	
		<RESISTOR>	
R1	1-247-706-11	SOLID 330 10% 1/4W	
R2	1-247-706-11	SOLID 330 10% 1/4W	
R3	1-247-706-11	SOLID 330 10% 1/4W	
R4	1-247-715-11	SOLID 1.5K 5% 1/4W	
R5	1-247-715-11	SOLID 1.5K 5% 1/4W	
R6	1-247-715-11	SOLID 1.5K 5% 1/4W	
R7	1-246-543-00	SOLID 820K 10% 1/4W	
R9	1-202-838-00	SOLID 100K 10% 1/2W	
R10	1-202-525-00	SOLID 10 10% 1/2W	
R12	1-247-694-11	SOLID 33 10% 1/4W	
R13	1-247-694-11	SOLID 33 10% 1/4W	
R14	1-247-694-11	SOLID 33 10% 1/4W	
		<SPARK GAP>	
SG1	1-519-063-99	DISCHARGING GAP	
**********			
	*A-1335-009-A	CA BOARD, COMPLETE	
		**********	
	4-373-933-01	SHEET (TRANSISTOR), BN	
		<CAPACITOR>	
C2	1-101-004-00	CERAMIC 0.01MF 50V	
C3	1-124-126-00	ELECT 47MF 20% 16V	
C4	1-124-126-00	ELECT 47MF 20% 16V	
C5	1-102-971-00	CERAMIC 82PF 5% 50V	
C6	1-101-004-00	CERAMIC 0.01MF 50V	
C7	1-101-004-00	CERAMIC 0.01MF 50V	
C8	1-124-126-00	ELECT 47MF 20% 25V	
C9	1-102-973-00	CERAMIC 100PF 5% 50V	
C12	1-124-126-00	ELECT 47MF 20% 16V	

CA

Ref. No.	Part No.	Description				Remark
C13	1-101-004-00	CERAMIC	0.01MF		50V	
C16	1-102-973-00	CERAMIC	100PF	5%	50V	
C17	1-136-153-00	FILM	0.01MF	5%	50V	
C18	1-101-006-00	CERAMIC	0.047MF		50V	
C19	1-136-157-00	FILM	0.022MF	5%	50V	
C20	1-101-004-00	CERAMIC	0.01MF		50V	
C21	1-101-006-00	CERAMIC	0.047MF		50V	
C22	1-108-680-11	MYLAR	0.001MF	10%	200V	
C23	1-124-798-11	ELECT	1MF	20%	160V	
C24	1-124-634-11	ELECT	1MF	20%	450V	
C101	1-126-103-11	ELECT	470MF	20%	16V	
C102	1-126-103-11	ELECT	470MF	20%	16V	
C103	1-101-004-00	CERAMIC	0.01MF		50V	
C104	1-101-004-00	CERAMIC	0.01MF		50V	
C105	1-126-101-11	ELECT	100MF	20%	16V	
C106	1-126-101-11	ELECT	100MF	20%	16V	
C107	1-126-101-11	ELECT	100MF	20%	16V	
C108	1-126-101-11	ELECT	100MF	20%	16V	
C109	1-101-004-00	CERAMIC	0.01MF		50V	
C110	1-101-004-00	CERAMIC	0.01MF		50V	
C111	1-101-004-00	CERAMIC	0.01MF		50V	
C113	1-126-101-11	ELECT	100MF	20%	16V	
C114	1-101-004-00	CERAMIC	0.01MF		50V	
C116	1-101-004-00	CERAMIC	0.01MF		50V	
C118	1-126-101-11	ELECT	100MF	20%	16V	
C120	1-101-004-00	CERAMIC	0.01MF		50V	
C121	1-101-004-00	CERAMIC	0.01MF		50V	
C122	1-126-101-11	ELECT	100MF	20%	16V	
C123	1-126-101-11	ELECT	100MF	20%	16V	
C124	1-101-004-00	CERAMIC	0.01MF		50V	
C125	1-101-004-00	CERAMIC	0.01MF		50V	
C126	1-101-004-00	CERAMIC	0.01MF		50V	
C127	1-101-004-00	CERAMIC	0.01MF		50V	
C128	1-126-101-11	ELECT	100MF	20%	16V	
C129	1-126-101-11	ELECT	100MF	20%	16V	
C130	1-101-004-00	CERAMIC	0.01MF		50V	
C131	1-101-004-00	CERAMIC	0.01MF		50V	
C134	1-124-046-00	ELECT	10MF	20%	160V	
C136	1-108-692-11	MYLAR	0.01MF	10%	200V	
C137	1-124-046-00	ELECT	10MF	20%	160V	
C138	1-124-046-00	ELECT	10MF	20%	160V	
C139	1-108-692-11	MYLAR	0.01MF	10%	200V	
C140	1-124-046-00	ELECT	10MF	20%	160V	
C141	1-108-692-11	MYLAR	0.01MF	10%	200V	
C202	1-101-004-00	CERAMIC	0.01MF		50V	
C203	1-124-126-00	ELECT	47MF	20%	16V	
C204	1-124-126-00	ELECT	47MF	20%	16V	
C205	1-102-971-00	CERAMIC	82PF	5%	50V	
C206	1-101-004-00	CERAMIC	0.01MF		50V	
C207	1-101-004-00	CERAMIC	0.01MF		50V	
C208	1-124-126-00	ELECT	47MF	20%	25V	
C209	1-102-973-00	CERAMIC	100PF	5%	50V	
C212	1-124-126-00	ELECT	47MF	20%	16V	
C213	1-101-004-00	CERAMIC	0.01MF		50V	
C216	1-102-973-00	CERAMIC	100PF	5%	50V	
C217	1-136-153-00	FILM	0.01MF	5%	50V	
C218	1-101-006-00	CERAMIC	0.047MF		50V	
C219	1-136-157-00	FILM	0.022MF	5%	50V	
C220	1-101-004-00	CERAMIC	0.01MF		50V	
C221	1-101-006-00	CERAMIC	0.047MF		50V	
C222	1-108-680-11	MYLAR	0.001MF	10%	200V	

Ref. No.	Part No.	Description				Remark
C223	1-124-798-11	ELECT	1MF	20%	160V	
C224	1-124-634-11	ELECT	1MF	20%	450V	
C301	1-126-103-11	ELECT	470MF	20%	16V	
C302	1-126-103-11	ELECT	470MF	20%	16V	
C303	1-101-004-00	CERAMIC	0.01MF		50V	
C304	1-101-004-00	CERAMIC	0.01MF		50V	
C305	1-126-101-11	ELECT	100MF	20%	16V	
C306	1-126-101-11	ELECT	100MF	20%	16V	
C307	1-126-101-11	ELECT	100MF	20%	16V	
C308	1-126-101-11	ELECT	100MF	20%	16V	
C309	1-101-004-00	CERAMIC	0.01MF		50V	
C310	1-101-004-00	CERAMIC	0.01MF		50V	
C311	1-101-004-00	CERAMIC	0.01MF		50V	
C313	1-126-101-11	ELECT	100MF	20%	16V	
C314	1-101-004-00	CERAMIC	0.01MF		50V	
C316	1-101-004-00	CERAMIC	0.01MF		50V	
C318	1-126-101-11	ELECT	100MF	20%	16V	
C320	1-101-004-00	CERAMIC	0.01MF		50V	
C321	1-101-004-00	CERAMIC	0.01MF		50V	
C322	1-126-101-11	ELECT	100MF	20%	16V	
C323	1-126-101-11	ELECT	100MF	20%	16V	
C324	1-101-004-00	CERAMIC	0.01MF		50V	
C325	1-101-004-00	CERAMIC	0.01MF		50V	
C326	1-101-004-00	CERAMIC	0.01MF		50V	
C327	1-101-004-00	CERAMIC	0.01MF		50V	
C328	1-126-101-11	ELECT	100MF	20%	16V	
C329	1-126-101-11	ELECT	100MF	20%	16V	
C330	1-101-004-00	CERAMIC	0.01MF		50V	
C331	1-101-004-00	CERAMIC	0.01MF		50V	
C334	1-124-046-00	ELECT	10MF	20%	160V	
C336	1-108-692-11	MYLAR	0.01MF	10%	200V	
C337	1-124-046-00	ELECT	10MF	20%	160V	
C338	1-124-046-00	ELECT	10MF	20%	160V	
C339	1-108-692-11	MYLAR	0.01MF	10%	200V	
C340	1-124-046-00	ELECT	10MF	20%	160V	
C341	1-108-692-11	MYLAR	0.01MF	10%	200V	
C402	1-101-004-00	CERAMIC	0.01MF		50V	
C403	1-124-126-00	ELECT	47MF	20%	16V	
C404	1-124-126-00	ELECT	47MF	20%	16V	
C405	1-102-971-00	CERAMIC	82PF	5%	50V	
C406	1-101-004-00	CERAMIC	0.01MF		50V	
C407	1-101-004-00	CERAMIC	0.01MF		50V	
C408	1-124-126-00	ELECT	47MF	20%	25V	
C409	1-102-973-00	CERAMIC	100PF	5%	50V	
C412	1-124-126-00	ELECT	47MF	20%	16V	
C413	1-101-004-00	CERAMIC	0.01MF		50V	
C416	1-102-973-00	CERAMIC	100PF	5%	50V	
C417	1-136-153-00	FILM	0.01MF	5%	50V	
C418	1-101-006-00	CERAMIC	0.047MF		50V	
C419	1-136-157-00	FILM	0.022MF	5%	50V	
C420	1-101-004-00	CERAMIC	0.01MF		50V	
C421	1-101-006-00	CERAMIC	0.047MF		50V	
C422	1-108-680-11	MYLAR	0.001MF	10%	200V	
C423	1-124-798-11	ELECT	1MF	20%	160V	
C424	1-124-634-11	ELECT	1MF	20%	450V	
C501	1-126-103-11	ELECT	470MF	20%	16V	
C502	1-126-103-11	ELECT	470MF	20%	16V	
C503	1-101-004-00	CERAMIC	0.01MF		50V	
C504	1-101-004-00	CERAMIC	0.01MF		50V	
C505	1-126-101-11	ELECT	100MF	20%	16V	
C506	1-126-101-11	ELECT	100MF	20%	16V	
C507	1-126-101-11	ELECT	100MF	20%	16V	

Ref. No.	Part No.	Description				Remark
C508	1-126-101-11	ELECT	100MF	20%	16V	
C509	1-101-004-00	CERAMIC	0.01MF		50V	
C510	1-101-004-00	CERAMIC	0.01MF		50V	
C511	1-101-004-00	CERAMIC	0.01MF		50V	
C513	1-126-101-11	ELECT	100MF	20%	16V	
C514	1-101-004-00	CERAMIC	0.01MF		50V	
C516	1-101-004-00	CERAMIC	0.01MF		50V	
C518	1-126-101-11	ELECT	100MF	20%	16V	
C520	1-101-004-00	CERAMIC	0.01MF		50V	
C521	1-101-004-00	CERAMIC	0.01MF		50V	
C522	1-126-101-11	ELECT	100MF	20%	16V	
C523	1-126-101-11	ELECT	100MF	20%	16V	
C524	1-101-004-00	CERAMIC	0.01MF		50V	
C525	1-101-004-00	CERAMIC	0.01MF		50V	
C526	1-101-004-00	CERAMIC	0.01MF		50V	
C527	1-101-004-00	CERAMIC	0.01MF		50V	
C528	1-126-101-11	ELECT	100MF	20%	16V	
C529	1-126-101-11	ELECT	100MF	20%	16V	
C530	1-101-004-00	CERAMIC	0.01MF		50V	
C531	1-101-004-00	CERAMIC	0.01MF		50V	
C534	1-124-046-00	ELECT	10MF	20%	160V	
C536	1-108-692-11	MYLAR	0.01MF	10%	200V	
C537	1-124-046-00	ELECT	10MF	20%	160V	
C538	1-124-046-00	ELECT	10MF	20%	160V	
C539	1-108-692-11	MYLAR	0.01MF	10%	200V	
C540	1-124-046-00	ELECT	10MF	20%	160V	
C541	1-108-692-11	MYLAR	0.01MF	10%	200V	
C601	1-102-944-00	CERAMIC	7PF	0.5PF	50V	
C602	1-126-101-11	ELECT	100MF	20%	16V	
C603	1-123-356-00	ELECT	10MF	20%	16V	
C604	1-123-356-00	ELECT	10MF	20%	16V	
C605	1-123-356-00	ELECT	10MF	20%	16V	
C606	1-124-126-00	ELECT	47MF	20%	16V	
C607	1-101-004-00	CERAMIC	0.01MF		50V	
C701	1-126-103-11	ELECT	470MF	20%	16V	
C703	1-101-004-00	CERAMIC	0.01MF		50V	
C704	1-101-004-00	CERAMIC	0.01MF		50V	
C705	1-126-101-11	ELECT	100MF	20%	16V	
C706	1-126-101-11	ELECT	100MF	20%	16V	
C738	1-124-046-00	ELECT	10MF	20%	160V	
C739	1-108-692-11	MYLAR	0.01MF	10%	200V	
C740	1-124-046-00	ELECT	10MF	20%	160V	

<CONNECTOR>

CA1	*1-566-057-11	PIN, CONNECTOR 5P	
CA2	*1-566-057-11	PIN, CONNECTOR 5P	
CA3	*1-566-057-11	PIN, CONNECTOR 5P	
CA4	*1-566-055-11	PIN, CONNECTOR 3P	
CA5	*1-566-060-11	PIN, CONNECTOR 8P	
CA6	*1-566-054-11	PIN, CONNECTOR 2P	
CA7	*1-566-054-11	PIN, CONNECTOR 2P	
CA8	*1-566-057-11	PIN, CONNECTOR 5P	
CA9	*1-566-056-11	PIN, CONNECTOR 4P	
CA10	*1-566-056-11	PIN, CONNECTOR 4P	
CA11	*1-566-056-11	PIN, CONNECTOR 4P	
CA12	*1-508-784-00	PIN, CONNECTOR (5MM PITCH) 1P	
CA13	*1-508-784-00	PIN, CONNECTOR (5MM PITCH) 1P	
CA14	*1-508-784-00	PIN, CONNECTOR (5MM PITCH) 1P	

<TRIMMER>

Ref. No.	Part No.	Description	Remark
CV1	1-141-181-11	CAP, TRIMMER	
CV2	1-141-181-11	CAP, TRIMMER	
CV201	1-141-181-11	CAP, TRIMMER	
CV202	1-141-181-11	CAP, TRIMMER	
CV401	1-141-181-11	CAP, TRIMMER	
CV402	1-141-181-11	CAP, TRIMMER	

<DIODE>

D1	8-719-110-12	DIODE RD9.1ES-B1	
D2	8-719-911-19	DIODE 1SS119	
D3	8-719-911-19	DIODE 1SS119	
D4	8-719-112-72	DIODE RD11ES-B2	
D5	8-719-901-83	DIODE 1SS83	
D6	8-719-901-83	DIODE 1SS83	
D7	8-719-911-19	DIODE 1SS119	
D8	8-719-911-19	DIODE 1SS119	
D12	8-719-911-19	DIODE 1SS119	
D13	8-719-911-19	DIODE 1SS119	
D15	8-719-971-20	DIODE ERC38-06	
D201	8-719-110-12	DIODE RD9.1ES-B1	
D202	8-719-911-19	DIODE 1SS119	
D203	8-719-911-19	DIODE 1SS119	
D204	8-719-112-72	DIODE RD11ES-B2	
D205	8-719-901-83	DIODE 1SS83	
D206	8-719-901-83	DIODE 1SS83	
D207	8-719-911-19	DIODE 1SS119	
D208	8-719-911-19	DIODE 1SS119	
D212	8-719-911-19	DIODE 1SS119	
D213	8-719-911-19	DIODE 1SS119	
D215	8-719-971-20	DIODE ERC38-06	
D401	8-719-110-12	DIODE RD9.1ES-B1	
D402	8-719-911-19	DIODE 1SS119	
D403	8-719-911-19	DIODE 1SS119	
D404	8-719-112-72	DIODE RD11ES-B2	
D405	8-719-901-83	DIODE 1SS83	
D406	8-719-901-83	DIODE 1SS83	
D407	8-719-911-19	DIODE 1SS119	
D408	8-719-911-19	DIODE 1SS119	
D412	8-719-911-19	DIODE 1SS119	
D413	8-719-911-19	DIODE 1SS119	
D415	8-719-971-20	DIODE ERC38-06	
D601	8-719-109-96	DIODE RD6.8ES-B1	
D602	8-719-901-83	DIODE 1SS83	
D603	8-719-911-19	DIODE 1SS119	

<IC>

IC2	8-759-990-82	IC TL082CP	
IC3	8-759-990-82	IC TL082CP	
IC4	8-759-140-53	IC MC14053BCP	
IC202	8-759-990-82	IC TL082CP	
IC203	8-759-990-82	IC TL082CP	
IC204	8-759-140-53	IC MC14053BCP	
IC402	8-759-990-82	IC TL082CP	
IC403	8-759-990-82	IC TL082CP	
IC404	8-759-140-53	IC MC14053BCP	

<JACK>

J1	*1-526-575-00	SOCKET, PLUG 1P	
J201	*1-526-575-00	SOCKET, PLUG 1P	

CA

Ref. No.	Part No.	Description	Remark
J401	*1-526-575-00	SOCKET, PLUG 1P	
		<COIL>	
L1	1-408-403-00	INDUCTOR 3.3UH	
L101	1-408-231-00	INDUCTOR 1MMH	
L102	1-408-231-00	INDUCTOR 1MMH	
L103	1-408-096-00	INDUCTOR 470UH	
L104	1-408-096-00	INDUCTOR 470UH	
L201	1-408-403-00	INDUCTOR 3.3UH	
L301	1-408-231-00	INDUCTOR 1MMH	
L302	1-408-231-00	INDUCTOR 1MMH	
L303	1-408-096-00	INDUCTOR 470UH	
L304	1-408-096-00	INDUCTOR 470UH	
L401	1-408-403-00	INDUCTOR 3.3UH	
L501	1-408-231-00	INDUCTOR 1MMH	
L502	1-408-231-00	INDUCTOR 1MMH	
L503	1-408-096-00	INDUCTOR 470UH	
L504	1-408-096-00	INDUCTOR 470UH	
L601	1-408-415-00	INDUCTOR 33UH	
L701	1-408-231-00	INDUCTOR 1MMH	
L704	1-408-096-00	INDUCTOR 470UH	
		<TRANSISTOR>	
Q1	8-729-105-88	TRANSISTOR 2SC2570A	
Q2	8-729-802-37	TRANSISTOR 2SC3595-D	
Q3	8-729-105-88	TRANSISTOR 2SC2570A	
Q4	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q5	8-729-802-37	TRANSISTOR 2SC3595-D	
Q6	8-729-805-05	TRANSISTOR 2SC3601-E	
Q7	8-729-804-58	TRANSISTOR 2SC3600-E	
Q8	8-729-804-63	TRANSISTOR 2SA1406-E	
Q9	8-729-802-37	TRANSISTOR 2SC3595-D	
Q10	8-729-802-44	TRANSISTOR 2SK125-4	
Q11	8-729-802-44	TRANSISTOR 2SK125-4	
Q12	8-729-802-44	TRANSISTOR 2SK125-4	
Q13	8-729-255-12	TRANSISTOR 2SC2551-R	
Q14	8-729-805-05	TRANSISTOR 2SC3601-E	
Q15	8-729-802-71	TRANSISTOR 2SA1407-D	
Q17	8-729-802-44	TRANSISTOR 2SK125-4	
Q18	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q19	8-729-820-82	TRANSISTOR 2SC2812-L5L6-TA	
Q20	8-729-820-82	TRANSISTOR 2SC2812-L5L6-TA	
Q23	8-729-107-84	TRANSISTOR 2SC3623A-L	
Q201	8-729-105-88	TRANSISTOR 2SC2570A	
Q202	8-729-802-37	TRANSISTOR 2SC3595-D	
Q203	8-729-105-88	TRANSISTOR 2SC2570A	
Q204	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q205	8-729-802-37	TRANSISTOR 2SC3595-D	
Q206	8-729-805-05	TRANSISTOR 2SC3601-E	
Q207	8-729-804-58	TRANSISTOR 2SC3600-E	
Q208	8-729-804-63	TRANSISTOR 2SA1406-E	
Q209	8-729-802-37	TRANSISTOR 2SC3595-D	
Q210	8-729-802-44	TRANSISTOR 2SK125-4	
Q211	8-729-802-44	TRANSISTOR 2SK125-4	
Q212	8-729-802-44	TRANSISTOR 2SK125-4	
Q213	8-729-255-12	TRANSISTOR 2SC2551-R	
Q214	8-729-805-05	TRANSISTOR 2SC3601-E	
Q215	8-729-802-71	TRANSISTOR 2SA1407-D	
Q217	8-729-802-44	TRANSISTOR 2SK125-4	
Q218	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q219	8-729-820-82	TRANSISTOR 2SC2812-L5L6-TA	
Q220	8-729-820-82	TRANSISTOR 2SC2812-L5L6-TA	
Q223	8-729-107-84	TRANSISTOR 2SC3623A-L	
Q401	8-729-105-88	TRANSISTOR 2SC2570A	
Q402	8-729-802-37	TRANSISTOR 2SC3595-D	
Q403	8-729-105-88	TRANSISTOR 2SC2570A	
Q404	8-729-103-19	TRANSISTOR 2SA1206-K1	
Q405	8-729-802-37	TRANSISTOR 2SC3595-D	
Q406	8-729-805-05	TRANSISTOR 2SC3601-E	
Q407	8-729-804-58	TRANSISTOR 2SC3600-E	
Q408	8-729-804-63	TRANSISTOR 2SA1406-E	
Q409	8-729-802-37	TRANSISTOR 2SC3595-D	
Q410	8-729-802-44	TRANSISTOR 2SK125-4	
Q411	8-729-802-44	TRANSISTOR 2SK125-4	
Q412	8-729-802-44	TRANSISTOR 2SK125-4	
Q413	8-729-255-12	TRANSISTOR 2SC2551-R	
Q414	8-729-805-05	TRANSISTOR 2SC3601-E	
Q415	8-729-802-71	TRANSISTOR 2SA1407-D	
Q417	8-729-802-44	TRANSISTOR 2SK125-4	
Q418	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q419	8-729-820-82	TRANSISTOR 2SC2812-L5L6-TA	
Q420	8-729-820-82	TRANSISTOR 2SC2812-L5L6-TA	
Q423	8-729-107-84	TRANSISTOR 2SC3623A-L	
Q601	8-729-105-88	TRANSISTOR 2SC2570A	
Q602	8-729-107-84	TRANSISTOR 2SC3623A-L	
Q603	8-729-105-88	TRANSISTOR 2SC2570A	
Q604	8-729-105-88	TRANSISTOR 2SC2570A	
Q605	8-729-105-88	TRANSISTOR 2SC2570A	
Q606	8-729-802-37	TRANSISTOR 2SC3595-D	
Q607	8-729-805-05	TRANSISTOR 2SC3601-E	
Q608	8-729-805-05	TRANSISTOR 2SC3601-E	
Q609	8-729-802-71	TRANSISTOR 2SA1407-D	
		<RESISTOR>	
R1	1-214-702-00	METAL 75 1% 1/4W	
R2	1-249-405-11	CARBON 100 5% 1/4W	
R3	1-249-420-11	CARBON 1.8K 5% 1/4W	
R4	1-215-415-00	METAL 560 1% 1/6W	
R5	1-215-413-00	METAL 470 1% 1/6W	
R6	1-215-423-00	METAL 1.2K 1% 1/6W	
R7	1-215-421-00	METAL 1K 1% 1/6W	
R8	1-215-413-00	METAL 470 1% 1/6W	
R9	1-215-445-00	METAL 10K 1% 1/6W	
R10	1-249-393-11	CARBON 10 5% 1/4W	
R11	1-215-417-00	METAL 680 1% 1/6W	
R12	1-215-401-11	METAL 150 1% 1/6W	
R13	1-249-405-11	CARBON 100 5% 1/4W	
R14	1-249-397-11	CARBON 22 5% 1/4W	
R15	1-215-405-00	METAL 220 1% 1/6W	
R16	1-214-823-00	METAL 20 1% 1/2W	
R17	1-215-373-31	METAL 10 1% 1/6W	
R18	1-218-353-11	METAL 1.5K 1% 10W	
R19	1-215-421-00	METAL 1K 1% 1/6W	
R20	1-215-419-00	METAL 820 1% 1/6W	
R21	1-215-441-00	METAL 6.8K 1% 1/6W	
R22	1-249-397-11	CARBON 22 5% 1/4W	
R23	1-249-397-11	CARBON 22 5% 1/4W	
R24	1-214-826-11	METAL 27 1% 1/2W	
R26	1-215-410-00	METAL 360 1% 1/6W	
R27	1-215-401-11	METAL 150 1% 1/6W	
R28	1-249-435-11	CARBON 33K 5% 1/4W	

Ref. No.	Part No.	Description				Remark
R29	1-249-441-11	CARBON	100K	5%	1/4W	
R30	1-249-431-11	CARBON	15K	5%	1/4W	
R31	1-249-429-11	CARBON	10K	5%	1/4W	
R32	1-249-435-11	CARBON	33K	5%	1/4W	
R33	1-249-395-11	CARBON	15	5%	1/4W	
R34	1-249-395-11	CARBON	15	5%	1/4W	
R35	1-215-449-00	METAL	15K	1%	1/6W	
R36	1-202-549-00	SOLID	100	5%	1/2W	
R37	1-215-403-00	METAL	180	1%	1/6W	
R38	1-215-401-11	METAL	150	1%	1/6W	
R40	1-215-380-00	METAL	20	1%	1/6W	
R41	1-215-415-00	METAL	560	1%	1/6W	
R42	1-215-447-00	METAL	12K	1%	1/6W	
R44	1-249-429-11	CARBON	10K	5%	1/4W	
R45	1-249-441-11	CARBON	100K	5%	1/4W	
R46	1-249-417-11	CARBON	1K	5%	1/4W	
R47	1-249-429-11	CARBON	10K	5%	1/4W	
R48	1-215-457-00	METAL	33K	1%	1/6W	
R49	1-215-409-00	METAL	330	1%	1/6W	
R50	1-215-427-00	METAL	1.8K	1%	1/6W	
R51	1-249-433-11	CARBON	22K	5%	1/4W	
R52	1-249-421-11	CARBON	2.2K	5%	1/4W	
R53	1-249-421-11	CARBON	2.2K	5%	1/4W	
R54	1-215-433-00	METAL	3.3K	1%	1/6W	
R55	1-215-433-00	METAL	3.3K	1%	1/6W	
R56	1-215-441-00	METAL	6.8K	1%	1/6W	
R57	1-215-433-00	METAL	3.3K	1%	1/6W	
R58	1-249-429-11	CARBON	10K	5%	1/4W	
R59	1-249-426-11	CARBON	5.6K	5%	1/4W	
R60	1-249-429-11	CARBON	10K	5%	1/4W	
R61	1-249-426-11	CARBON	5.6K	5%	1/4W	
R62	1-249-397-11	CARBON	22	5%	1/4W	
R63	1-215-438-00	METAL	5.1K	1%	1/6W	
R64	1-214-908-00	METAL	62K	1%	1/2W	
R65	1-249-405-11	CARBON	100	5%	1/4W	
R66	1-249-440-11	CARBON	82K	5%	1/4W	
R67	1-247-903-00	CARBON	1M	5%	1/4W	
R68	1-249-406-11	CARBON	120	5%	1/4W	
R73	1-249-400-11	CARBON	39	5%	1/4W	
R74	1-249-400-11	CARBON	39	5%	1/4W	
R76	1-202-549-00	SOLID	100	5%	1/2W	
R80	1-215-863-11	METAL OXIDE	100	5%	1W	F
R90	1-215-863-11	METAL OXIDE	100	5%	1W	F
R91	1-215-863-11	METAL OXIDE	100	5%	1W	F
R201	1-214-702-00	METAL	75	1%	1/4W	
R202	1-249-405-11	CARBON	100	5%	1/4W	
R203	1-249-420-11	CARBON	1.8K	5%	1/4W	
R204	1-215-415-00	METAL	560	1%	1/6W	
R205	1-215-413-00	METAL	470	1%	1/6W	
R206	1-215-423-00	METAL	1.2K	1%	1/6W	
R207	1-215-421-00	METAL	1K	1%	1/6W	
R208	1-215-413-00	METAL	470	1%	1/6W	
R209	1-215-445-00	METAL	10K	1%	1/6W	
R210	1-249-393-11	CARBON	10	5%	1/4W	
R211	1-215-417-00	METAL	680	1%	1/6W	
R212	1-215-401-11	METAL	150	1%	1/6W	
R213	1-249-405-11	CARBON	100	5%	1/4W	
R214	1-249-397-11	CARBON	22	5%	1/4W	
R215	1-215-405-00	METAL	220	1%	1/6W	
R216	1-214-823-00	METAL	20	1%	1/2W	
R217	1-215-373-31	METAL	10	1%	1/6W	
R218	1-218-353-11	METAL	1.5K	1%	10W	

Ref. No.	Part No.	Description				Remark
R219	1-215-421-00	METAL	1K	1%	1/6W	
R220	1-215-419-00	METAL	820	1%	1/6W	
R221	1-215-441-00	METAL	6.8K	1%	1/6W	
R222	1-249-397-11	CARBON	22	5%	1/4W	
R223	1-249-397-11	CARBON	22	5%	1/4W	
R224	1-214-826-11	METAL	27	1%	1/2W	
R226	1-215-410-00	METAL	360	1%	1/6W	
R227	1-215-401-11	METAL	150	1%	1/6W	
R228	1-249-435-11	CARBON	33K	5%	1/4W	
R229	1-249-441-11	CARBON	100K	5%	1/4W	
R230	1-249-431-11	CARBON	15K	5%	1/4W	
R231	1-249-429-11	CARBON	10K	5%	1/4W	
R232	1-249-435-11	CARBON	33K	5%	1/4W	
R233	1-249-395-11	CARBON	15	5%	1/4W	
R234	1-249-395-11	CARBON	15	5%	1/4W	
R235	1-215-449-00	METAL	15K	1%	1/6W	
R236	1-202-549-00	SOLID	100	5%	1/2W	
R237	1-215-403-00	METAL	180	1%	1/6W	
R238	1-215-401-11	METAL	150	1%	1/6W	
R240	1-215-380-00	METAL	20	1%	1/6W	
R241	1-215-415-00	METAL	560	1%	1/6W	
R242	1-215-447-00	METAL	12K	1%	1/6W	
R244	1-249-429-11	CARBON	10K	5%	1/4W	
R245	1-249-441-11	CARBON	100K	5%	1/4W	
R246	1-249-417-11	CARBON	1K	5%	1/4W	
R247	1-249-429-11	CARBON	10K	5%	1/4W	
R248	1-215-457-00	METAL	33K	1%	1/6W	
R249	1-215-409-00	METAL	330	1%	1/6W	
R250	1-215-427-00	METAL	1.8K	1%	1/6W	
R251	1-249-433-11	CARBON	22K	5%	1/4W	
R252	1-249-421-11	CARBON	2.2K	5%	1/4W	
R253	1-249-421-11	CARBON	2.2K	5%	1/4W	
R254	1-215-433-00	METAL	3.3K	1%	1/6W	
R255	1-215-433-00	METAL	3.3K	1%	1/6W	
R256	1-215-441-00	METAL	6.8K	1%	1/6W	
R257	1-215-433-00	METAL	3.3K	1%	1/6W	
R258	1-249-429-11	CARBON	10K	5%	1/4W	
R259	1-249-426-11	CARBON	5.6K	5%	1/4W	
R260	1-249-429-11	CARBON	10K	5%	1/4W	
R261	1-249-426-11	CARBON	5.6K	5%	1/4W	
R262	1-249-397-11	CARBON	22	5%	1/4W	
R263	1-215-438-00	METAL	5.1K	1%	1/6W	
R264	1-214-908-00	METAL	62K	1%	1/2W	
R265	1-249-405-11	CARBON	100	5%	1/4W	
R266	1-249-440-11	CARBON	82K	5%	1/4W	
R267	1-247-903-00	CARBON	1M	5%	1/4W	
R268	1-249-406-11	CARBON	120	5%	1/4W	
R273	1-249-400-11	CARBON	39	5%	1/4W	
R274	1-249-400-11	CARBON	39	5%	1/4W	
R276	1-202-549-00	SOLID	100	5%	1/2W	
R280	1-215-863-11	METAL OXIDE	100	5%	1W	F
R290	1-215-863-11	METAL OXIDE	100	5%	1W	F
R291	1-215-863-11	METAL OXIDE	100	5%	1W	F
R401	1-214-702-00	METAL	75	1%	1/4W	
R402	1-249-405-11	CARBON	100	5%	1/4W	
R403	1-249-420-11	CARBON	1.8K	5%	1/4W	
R404	1-215-415-00	METAL	560	1%	1/6W	
R405	1-215-413-00	METAL	470	1%	1/6W	
R406	1-215-423-00	METAL	1.2K	1%	1/6W	
R407	1-215-421-00	METAL	1K	1%	1/6W	
R408	1-215-413-00	METAL	470	1%	1/6W	

CA **DA**

Ref. No.	Part No.	Description				Remark
R409	1-215-445-00	METAL	10K	1%	1/6W	
R410	1-249-393-11	CARBON	10	5%	1/4W	
R411	1-215-417-00	METAL	680	1%	1/6W	
R412	1-215-401-11	METAL	150	1%	1/6W	
R413	1-249-405-11	CARBON	100	5%	1/4W	
R414	1-249-397-11	CARBON	22	5%	1/4W	
R415	1-215-405-00	METAL	220	1%	1/6W	
R416	1-214-823-00	METAL	20	1%	1/2W	
R417	1-215-373-31	METAL	10	1%	1/6W	
R418	1-218-353-11	METAL	1.5K	1%	10W	
R419	1-215-421-00	METAL	1K	1%	1/6W	
R420	1-215-419-00	METAL	820	1%	1/6W	
R421	1-215-441-00	METAL	6.8K	1%	1/6W	
R422	1-249-397-11	CARBON	22	5%	1/4W	
R423	1-249-397-11	CARBON	22	5%	1/4W	
R424	1-214-826-11	METAL	27	1%	1/2W	
R426	1-215-410-00	METAL	360	1%	1/6W	
R427	1-215-401-11	METAL	150	1%	1/6W	
R428	1-249-435-11	CARBON	33K	5%	1/4W	
R429	1-249-441-11	CARBON	100K	5%	1/4W	
R430	1-249-431-11	CARBON	15K	5%	1/4W	
R431	1-249-429-11	CARBON	10K	5%	1/4W	
R432	1-249-435-11	CARBON	33K	5%	1/4W	
R433	1-249-395-11	CARBON	15	5%	1/4W	
R434	1-249-395-11	CARBON	15	5%	1/4W	
R435	1-215-449-00	METAL	15K	1%	1/6W	
R436	1-202-549-00	SOLID	100	5%	1/2W	
R437	1-215-403-00	METAL	180	1%	1/6W	
R438	1-215-401-11	METAL	150	1%	1/6W	
R440	1-215-380-00	METAL	20	1%	1/6W	
R441	1-215-415-00	METAL	560	1%	1/6W	
R442	1-215-447-00	METAL	12K	1%	1/6W	
R444	1-249-429-11	CARBON	10K	5%	1/4W	
R445	1-249-441-11	CARBON	100K	5%	1/4W	
R446	1-249-417-11	CARBON	1K	5%	1/4W	
R447	1-249-429-11	CARBON	10K	5%	1/4W	
R448	1-215-457-00	METAL	33K	1%	1/6W	
R449	1-215-409-00	METAL	330	1%	1/6W	
R450	1-215-427-00	METAL	1.8K	1%	1/6W	
R451	1-249-433-11	CARBON	22K	5%	1/4W	
R452	1-249-421-11	CARBON	2.2K	5%	1/4W	
R453	1-249-421-11	CARBON	2.2K	5%	1/4W	
R454	1-215-433-00	METAL	3.3K	1%	1/6W	
R455	1-215-433-00	METAL	3.3K	1%	1/6W	
R456	1-215-441-00	METAL	6.8K	1%	1/6W	
R457	1-215-433-00	METAL	3.3K	1%	1/6W	
R458	1-249-429-11	CARBON	10K	5%	1/4W	
R459	1-249-426-11	CARBON	5.6K	5%	1/4W	
R460	1-249-429-11	CARBON	10K	5%	1/4W	
R461	1-249-426-11	CARBON	5.6K	5%	1/4W	
R462	1-249-397-11	CARBON	22	5%	1/4W	
R463	1-215-438-00	METAL	5.1K	1%	1/6W	
R464	1-214-908-00	METAL	62K	1%	1/2W	
R465	1-249-405-11	CARBON	100	5%	1/4W	
R466	1-249-440-11	CARBON	82K	5%	1/4W	
R467	1-247-903-00	CARBON	1M	5%	1/4W	
R468	1-249-406-11	CARBON	120	5%	1/4W	
R473	1-249-400-11	CARBON	39	5%	1/4W	
R474	1-249-400-11	CARBON	39	5%	1/4W	
R476	1-202-549-00	SOLID	100	5%	1/2W	
R480	1-215-863-11	METAL OXIDE	100	5%	1W	F
R490	1-215-863-11	METAL OXIDE	100	5%	1W	F
R491	1-215-863-11	METAL OXIDE	100	5%	1W	F
R601	1-249-430-11	CARBON	12K	5%	1/4W	
R602	1-249-427-11	CARBON	6.8K	5%	1/4W	
R603	1-249-434-11	CARBON	27K	5%	1/4W	
R604	1-249-421-11	CARBON	2.2K	5%	1/4W	
R605	1-249-441-11	CARBON	100K	5%	1/4W	
R606	1-249-405-11	CARBON	100	5%	1/4W	
R607	1-249-405-11	CARBON	100	5%	1/4W	
R608	1-215-435-00	METAL	3.9K	1%	1/6W	
R609	1-215-413-00	METAL	470	1%	1/6W	
R610	1-249-405-11	CARBON	100	5%	1/4W	
R611	1-215-429-00	METAL	2.2K	1%	1/6W	
R612	1-215-421-00	METAL	1K	1%	1/6W	
R613	1-249-413-11	CARBON	470	5%	1/4W	
R614	1-249-405-11	CARBON	100	5%	1/4W	
R615	1-249-405-11	CARBON	100	5%	1/4W	
R616	1-249-405-11	CARBON	100	5%	1/4W	
R617	1-215-920-11	METAL OXIDE	3.3K	5%	3W	F
R618	1-249-427-11	CARBON	6.8K	5%	1/4W	
R619	1-215-902-11	METAL OXIDE	47K	5%	1W	F
R620	1-215-441-00	METAL	6.8K	1%	1/6W	

<VARIABLE RESISTOR>

RV1	1-237-518-21	RES, ADJ, CERMET 10K	
RV2	1-237-519-21	RES, ADJ, CERMET 20K	
RV201	1-237-518-21	RES, ADJ, CERMET 10K	
RV202	1-237-519-21	RES, ADJ, CERMET 20K	
RV401	1-237-518-21	RES, ADJ, CERMET 10K	
RV402	1-237-519-21	RES, ADJ, CERMET 20K	

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*A-1345-650-A	DA BOARD, COMPLETE	
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3-618-225-00	NUT, PLATE	
*4-353-708-00	HOOK, FINGER	
4-378-915-01	NUT (M2.6), PLATE	

<CAPACITOR>

C1	1-101-004-00	CERAMIC	0.01MF	50V
C2	1-130-471-00	MYLAR	0.001MF 5%	50V
C3	1-102-978-00	CERAMIC	220PF 5%	50V
C4	1-136-169-00	FILM	0.22MF 5%	50V
C5	1-123-356-00	ELECT	10MF 20%	16V
C6	1-136-153-00	FILM	0.01MF 5%	50V
C7	1-123-356-00	ELECT	10MF 20%	16V
C8	1-123-380-00	ELECT	1MF 20%	50V
C9	1-136-165-00	FILM	0.1MF 5%	50V
C10	1-101-004-00	CERAMIC	0.01MF	50V
C11	1-101-004-00	CERAMIC	0.01MF	50V
C12	1-123-356-00	ELECT	10MF 20%	16V
C13	1-130-475-00	MYLAR	0.0022MF 5%	50V
C14	1-101-004-00	CERAMIC	0.01MF	50V
C15	1-123-381-00	ELECT	2.2MF 20%	50V
C16	1-123-381-00	ELECT	2.2MF 20%	50V
C17	1-124-768-11	ELECT	4.7MF 20%	50V
C18	1-123-369-00	ELECT	4.7MF 20%	50V
C19	1-123-356-00	ELECT	10MF 20%	16V
C20	1-101-004-00	CERAMIC	0.01MF	50V
C21	1-101-004-00	CERAMIC	0.01MF	50V

Ref. No.	Part No.	Description				Remark
C24	1-123-321-00	ELECT	220MF	20%	16V	
C25	1-123-321-00	ELECT	220MF	20%	16V	
C26	1-123-321-00	ELECT	220MF	20%	16V	
C27	1-123-321-00	ELECT	220MF	20%	16V	
C28	1-136-165-00	FILM	0.1MF	5%	50V	
C29	1-101-004-00	CERAMIC	0.01MF		50V	
C30	1-101-004-00	CERAMIC	0.01MF		50V	
C32	1-136-169-00	FILM	0.22MF	5%	50V	
C34	1-124-122-11	ELECT	100MF	20%	16V	
C35	1-124-768-11	ELECT	4.7MF	20%	50V	
C36	1-101-004-00	CERAMIC	0.01MF		50V	
C37	1-101-004-00	CERAMIC	0.01MF		50V	
C38	1-123-356-00	ELECT	10MF	20%	16V	
C39	1-126-529-11	ELECT	0.47MF	20%	50V	
C40	1-136-165-00	FILM	0.1MF	5%	50V	
C41	1-123-356-00	ELECT	10MF	20%	16V	
C42	1-101-004-00	CERAMIC	0.01MF		50V	
C43	1-101-004-00	CERAMIC	0.01MF		50V	
C44	1-123-356-00	ELECT	10MF	20%	16V	
C45	1-130-477-00	MYLAR	0.0033MF	5%	50V	
C46	1-123-356-00	ELECT	10MF	20%	16V	
C47	1-101-004-00	CERAMIC	0.01MF		50V	
C48	1-101-004-00	CERAMIC	0.01MF		50V	
C49	1-101-004-00	CERAMIC	0.01MF		50V	
C50	1-123-321-00	ELECT	220MF	20%	16V	
C51	1-123-356-00	ELECT	10MF	20%	16V	
C52	1-130-471-00	MYLAR	0.001MF	5%	50V	
C53	1-101-004-00	CERAMIC	0.01MF		50V	
C54	1-101-004-00	CERAMIC	0.01MF		50V	
C55	1-123-356-00	ELECT	10MF	20%	16V	
C56	1-101-004-00	CERAMIC	0.01MF		50V	
C57	1-130-471-00	MYLAR	0.001MF	5%	50V	
C58	1-123-356-00	ELECT	10MF	20%	16V	
C59	1-101-004-00	CERAMIC	0.01MF		50V	
C61	1-123-356-00	ELECT	10MF	20%	16V	
C62	1-101-004-00	CERAMIC	0.01MF		50V	
C63	1-101-004-00	CERAMIC	0.01MF		50V	
C64	1-123-380-00	ELECT	1MF	20%	50V	
C65	1-130-471-00	MYLAR	0.001MF	5%	50V	
C67	1-101-004-00	CERAMIC	0.01MF		50V	
C68	1-130-471-00	MYLAR	0.001MF	5%	50V	
C69	1-101-004-00	CERAMIC	0.01MF		50V	
C70	1-101-004-00	CERAMIC	0.01MF		50V	
C71	1-123-356-00	ELECT	10MF	20%	16V	
C72	1-101-004-00	CERAMIC	0.01MF		50V	
C74	1-130-471-00	MYLAR	0.001MF	5%	50V	
C75	1-136-165-00	FILM	0.1MF	5%	50V	
C76	1-101-004-00	CERAMIC	0.01MF		50V	
C77	1-101-004-00	CERAMIC	0.01MF		50V	
C78	1-123-356-00	ELECT	10MF	20%	16V	
C79	1-136-169-00	FILM	0.22MF	5%	50V	
C80	1-101-004-00	CERAMIC	0.01MF		50V	
C81	1-101-004-00	CERAMIC	0.01MF		50V	
C82	1-101-004-00	CERAMIC	0.01MF		50V	
C83	1-101-004-00	CERAMIC	0.01MF		50V	
C84	1-124-768-11	ELECT	4.7MF	20%	50V	
C85	1-124-768-11	ELECT	4.7MF	20%	50V	
C86	1-123-356-00	ELECT	10MF	20%	16V	
C87	1-124-768-11	ELECT	4.7MF	20%	50V	
C88	1-136-165-00	FILM	0.1MF	5%	50V	
C89	1-101-004-00	CERAMIC	0.01MF		50V	
C100	1-130-479-00	MYLAR	0.0047MF	5%	50V	
C101	1-130-479-00	MYLAR	0.0047MF	5%	50V	
C102	1-130-479-00	MYLAR	0.0047MF	5%	50V	
C103	1-130-479-00	MYLAR	0.0047MF	5%	50V	
C104	1-101-004-00	CERAMIC	0.01MF		50V	
C108	1-136-153-00	FILM	0.01MF	5%	50V	
C109	1-136-165-00	FILM	0.1MF	5%	50V	
C110	1-101-004-00	CERAMIC	0.01MF		50V	
C112	1-101-004-00	CERAMIC	0.01MF		50V	
C113	1-101-004-00	CERAMIC	0.01MF		50V	
C114	1-101-004-00	CERAMIC	0.01MF		50V	
C115	1-101-004-00	CERAMIC	0.01MF		50V	

<DIODE>

D1	8-719-109-85	DIODE RD5.1ESB2	
D10	8-719-911-19	DIODE 1SS119	
D11	8-719-911-19	DIODE 1SS119	
D12	8-719-911-19	DIODE 1SS119	
D13	8-719-911-19	DIODE 1SS119	
D14	8-719-911-19	DIODE 1SS119	
D15	8-719-911-19	DIODE 1SS119	
D17	8-719-971-20	DIODE ERC38-06	
D18	8-719-971-20	DIODE ERC38-06	
D25	8-719-971-20	DIODE ERC38-06	

<CONNECTOR>

DA1	*1-562-729-11	CONNECTOR, MULTI 64P	

<IC>

IC1	8-759-981-64	IC LM2903DQ	
IC2	8-759-991-02	IC NE555P	
IC3	8-759-945-58	IC RC4558P	
IC4	8-759-131-11	IC UPC311	
IC5	8-759-945-58	IC RC4558P	
IC7	8-759-945-58	IC RC4558P	
IC8	8-759-990-82	IC TL082CP	
IC9	8-759-133-90	IC UPC339	
IC10	8-759-981-64	IC LM2903DQ	
IC11	8-759-109-88	IC UPC624	
IC12	8-759-945-58	IC RC4558P	
IC13	8-759-109-88	IC UPC624	
IC14	8-759-945-58	IC RC4558P	
IC15	8-759-945-58	IC RC4558P	
IC16	8-759-109-88	IC UPC624	
IC17	8-759-945-58	IC RC4558P	
IC18	8-759-109-88	IC UPC624	
IC19	8-759-945-58	IC RC4558P	
IC20	8-759-945-58	IC RC4558P	
IC21	8-759-990-82	IC TL082CP	
IC22	8-759-982-23	IC RC78L08A	
IC23	8-759-701-67	IC NJM79M08FA	
IC24	8-766-001-49	TRANSISTOR TX-429M	
IC25	8-766-001-49	TRANSISTOR TX-429M	
IC27	8-759-991-02	IC NE555P	

<TRANSISTOR>

Q1	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q2	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q3	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q4	8-729-119-78	TRANSISTOR 2SC2785-HFE	

DA

Ref. No.	Part No.	Description	Remark
Q5	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q6	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q7	8-729-105-73	TRANSISTOR 2SK523-L2	
Q8	8-729-105-73	TRANSISTOR 2SK523-L2	
Q10	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q11	8-729-105-73	TRANSISTOR 2SK523-L2	
Q12	8-729-105-73	TRANSISTOR 2SK523-L2	
Q13	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q14	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q15	8-729-105-73	TRANSISTOR 2SK523-L2	
Q16	8-729-105-73	TRANSISTOR 2SK523-L2	
Q21	8-729-105-73	TRANSISTOR 2SK523-L2	
Q22	8-729-105-73	TRANSISTOR 2SK523-L2	

<RESISTOR>

Ref. No.	Part No.	Description			Remark
R1	1-249-428-11	CARBON	8.2K	5% 1/4W	
R2	1-249-431-11	CARBON	15K	5% 1/4W	
R3	1-249-428-11	CARBON	8.2K	5% 1/4W	
R4	1-249-428-11	CARBON	8.2K	5% 1/4W	
R5	1-249-418-11	CARBON	1.2K	5% 1/4W	
R6	1-249-417-11	CARBON	1K	5% 1/4W	
R7	1-249-437-11	CARBON	47K	5% 1/4W	
R8	1-249-417-11	CARBON	1K	5% 1/4W	
R9	1-215-427-00	METAL	1.8K	1% 1/6W	
R10	1-249-428-11	CARBON	8.2K	5% 1/4W	
R11	1-249-428-11	CARBON	8.2K	5% 1/4W	
R12	1-249-428-11	CARBON	8.2K	5% 1/4W	
R14	1-249-423-11	CARBON	3.3K	5% 1/4W	
R15	1-249-425-11	CARBON	4.7K	5% 1/4W	
R16	1-249-405-11	CARBON	100	5% 1/4W	
R17	1-215-445-00	METAL	10K	1% 1/6W	
R18	1-215-429-00	METAL	2.2K	1% 1/6W	
R19	1-215-429-00	METAL	2.2K	1% 1/6W	
R20	1-215-467-00	METAL	82K	1% 1/6W	
R21	1-249-434-11	CARBON	27K	5% 1/4W	
R22	1-249-437-11	CARBON	47K	5% 1/4W	
R23	1-215-397-00	METAL	100	1% 1/6W	
R24	1-249-427-11	CARBON	6.8K	5% 1/4W	
R25	1-249-421-11	CARBON	2.2K	5% 1/4W	
R26	1-215-439-00	METAL	5.6K	1% 1/6W	
R27	1-215-409-00	METAL	330	1% 1/6W	
R28	1-215-441-00	METAL	6.8K	1% 1/6W	
R29	1-215-449-00	METAL	15K	1% 1/6W	
R30	1-215-413-00	METAL	470	1% 1/6W	
R31	1-249-431-11	CARBON	15K	5% 1/4W	
R32	1-249-431-11	CARBON	15K	5% 1/4W	
R33	1-215-427-00	METAL	1.8K	1% 1/6W	
R34	1-215-439-00	METAL	5.6K	1% 1/6W	
R35	1-215-453-00	METAL	22K	1% 1/6W	
R36	1-215-447-00	METAL	12K	1% 1/6W	
R37	1-215-373-31	METAL	10	1% 1/6W	
R38	1-215-437-00	METAL	4.7K	1% 1/6W	
R39	1-215-429-00	METAL	2.2K	1% 1/6W	
R40	1-215-445-00	METAL	10K	1% 1/6W	
R41	1-215-439-00	METAL	5.6K	1% 1/6W	
R42	1-215-429-00	METAL	2.2K	1% 1/6W	
R43	1-215-413-00	METAL	470	1% 1/6W	
R44	1-215-421-00	METAL	1K	1% 1/6W	
R45	1-249-441-11	CARBON	100K	5% 1/4W	
R46	1-249-431-11	CARBON	15K	5% 1/4W	
R59	1-215-477-00	METAL	220K	1% 1/6W	
R60	1-249-425-11	CARBON	4.7K	5% 1/4W	
R61	1-249-405-11	CARBON	100	5% 1/4W	
R62	1-249-437-11	CARBON	47K	5% 1/4W	
R63	1-249-441-11	CARBON	100K	5% 1/4W	
R64	1-247-903-00	CARBON	1M	5% 1/4W	
R65	1-215-443-00	METAL	8.2K	1% 1/6W	
R66	1-215-397-00	METAL	100	1% 1/6W	
R67	1-215-441-00	METAL	6.8K	1% 1/6W	
R68	1-215-441-00	METAL	6.8K	1% 1/6W	
R69	1-215-427-00	METAL	1.8K	1% 1/6W	
R70	1-215-433-00	METAL	3.3K	1% 1/6W	
R71	1-215-441-00	METAL	6.8K	1% 1/6W	
R72	1-215-433-00	METAL	3.3K	1% 1/6W	
R73	1-215-427-00	METAL	1.8K	1% 1/6W	
R74	1-215-477-00	METAL	220K	1% 1/6W	
R75	1-215-389-00	METAL	47	1% 1/6W	
R76	1-215-413-00	METAL	470	1% 1/6W	
R77	1-215-397-00	METAL	100	1% 1/6W	
R78	1-249-441-11	CARBON	100K	5% 1/4W	
R79	1-249-424-11	CARBON	3.9K	5% 1/4W	
R80	1-249-427-11	CARBON	6.8K	5% 1/4W	
R81	1-249-428-11	CARBON	8.2K	5% 1/4W	
R82	1-249-423-11	CARBON	3.3K	5% 1/4W	
R83	1-249-427-11	CARBON	6.8K	5% 1/4W	
R84	1-249-427-11	CARBON	6.8K	5% 1/4W	
R85	1-249-429-11	CARBON	10K	5% 1/4W	
R86	1-249-429-11	CARBON	10K	5% 1/4W	
R87	1-249-429-11	CARBON	10K	5% 1/4W	
R88	1-249-422-11	CARBON	2.7K	5% 1/4W	
R89	1-249-417-11	CARBON	1K	5% 1/4W	
R94	1-249-429-11	CARBON	10K	5% 1/4W	
R95	1-249-429-11	CARBON	10K	5% 1/4W	
R96	1-247-713-11	CARBON	1K	5% 1/4W	
R97	1-215-437-00	METAL	4.7K	1% 1/6W	
R98	1-215-437-00	METAL	4.7K	1% 1/6W	
R99	1-215-437-00	METAL	4.7K	1% 1/6W	
R100	1-215-437-00	METAL	4.7K	1% 1/6W	
R101	1-215-437-00	METAL	4.7K	1% 1/6W	
R102	1-215-437-00	METAL	4.7K	1% 1/6W	
R103	1-215-437-00	METAL	4.7K	1% 1/6W	
R104	1-215-437-00	METAL	4.7K	1% 1/6W	
R105	1-215-445-00	METAL	10K	1% 1/6W	
R106	1-249-425-11	CARBON	4.7K	5% 1/4W	
R107	1-215-445-00	METAL	10K	1% 1/6W	
R108	1-215-445-00	METAL	10K	1% 1/6W	
R109	1-215-445-00	METAL	10K	1% 1/6W	
R110	1-215-445-00	METAL	10K	1% 1/6W	
R111	1-249-425-11	CARBON	4.7K	5% 1/4W	
R112	1-215-445-00	METAL	10K	1% 1/6W	
R113	1-215-463-00	METAL	56K	1% 1/6W	
R114	1-215-437-00	METAL	4.7K	1% 1/6W	
R115	1-215-445-00	METAL	10K	1% 1/6W	
R116	1-215-445-00	METAL	10K	1% 1/6W	
R117	1-249-425-11	CARBON	4.7K	5% 1/4W	
R118	1-215-445-00	METAL	10K	1% 1/6W	
R119	1-215-433-00	METAL	3.3K	1% 1/6W	
R120	1-215-445-00	METAL	10K	1% 1/6W	
R121	1-249-425-11	CARBON	4.7K	5% 1/4W	
R122	1-215-445-00	METAL	10K	1% 1/6W	
R123	1-215-461-00	METAL	47K	1% 1/6W	
R124	1-249-421-11	CARBON	2.2K	5% 1/4W	

Ref. No.	Part No.	Description				Remark
R125	1-249-427-11	CARBON	6.8K	5%	1/4W	
R126	1-249-427-11	CARBON	6.8K	5%	1/4W	
R127	1-249-427-11	CARBON	6.8K	5%	1/4W	
R128	1-249-441-11	CARBON	100K	5%	1/4W	
R129	1-215-437-00	METAL	4.7K	1%	1/6W	
R130	1-215-437-00	METAL	4.7K	1%	1/6W	
R131	1-215-437-00	METAL	4.7K	1%	1/6W	
R132	1-215-437-00	METAL	4.7K	1%	1/6W	
R133	1-215-437-00	METAL	4.7K	1%	1/6W	
R134	1-215-437-00	METAL	4.7K	1%	1/6W	
R135	1-215-437-00	METAL	4.7K	1%	1/6W	
R136	1-215-437-00	METAL	4.7K	1%	1/6W	
R137	1-249-425-11	CARBON	4.7K	5%	1/4W	
R138	1-215-455-00	METAL	27K	1%	1/6W	
R139	1-249-405-11	CARBON	100	5%	1/4W	
R140	1-249-437-11	CARBON	47K	5%	1/4W	
R141	1-249-441-11	CARBON	100K	5%	1/4W	
R142	1-247-903-00	CARBON	1M	5%	1/4W	
R143	1-215-409-00	METAL	330	1%	1/6W	
R144	1-215-427-00	METAL	1.8K	1%	1/6W	
R145	1-215-425-00	METAL	1.5K	1%	1/6W	
R149	1-249-420-11	CARBON	1.8K	5%	1/4W	
R150	1-215-427-00	METAL	1.8K	1%	1/6W	
R151	1-249-441-11	CARBON	100K	5%	1/4W	
R152	1-215-459-00	METAL	39K	1%	1/6W	
R153	1-215-433-00	METAL	3.3K	1%	1/6W	
R154	1-215-413-00	METAL	470	1%	1/6W	
R155	1-249-428-11	CARBON	8.2K	5%	1/4W	
R156	1-249-441-11	CARBON	100K	5%	1/4W	
R160	1-215-433-00	METAL	3.3K	1%	1/6W	
R161	1-249-429-11	CARBON	10K	5%	1/4W	
R167	1-215-437-00	METAL	4.7K	1%	1/6W	
R168	1-249-441-11	CARBON	100K	5%	1/4W	
R169	1-215-397-00	METAL	100	1%	1/6W	
R170	1-215-421-00	METAL	1K	1%	1/6W	
R171	1-215-429-00	METAL	2.2K	1%	1/6W	
R172	1-215-421-00	METAL	1K	1%	1/6W	
R173	1-249-441-11	CARBON	100K	5%	1/4W	
R177	1-215-429-00	METAL	2.2K	1%	1/6W	

<VARIABLE RESISTOR>

RV1	1-237-506-21	RES, ADJ, CERMET 100K
RV2	1-237-503-21	RES, ADJ, CERMET 10K

****

	*A-1345-651-A	DB BOARD, COMPLETE
		**********
	*1-526-656-00	SOCKET, IC (DP) 20P
	*4-353-708-00	HOOK, FINGER
	4-378-915-01	NUT (M2.6), PLATE

<CAPACITOR>

C1	1-123-321-00	ELECT	220MF	20%	16V
C2	1-123-321-00	ELECT	220MF	20%	16V
C3	1-123-321-00	ELECT	220MF	20%	16V
C4	1-123-321-00	ELECT	220MF	20%	16V
C5	1-123-321-00	ELECT	220MF	20%	16V
C6	1-123-356-00	ELECT	10MF	20%	16V
C18	1-101-888-00	CERAMIC	68PF	5%	50V
C19	1-101-004-00	CERAMIC	0.01MF		50V
C20	1-101-004-00	CERAMIC	0.01MF		50V
C21	1-101-888-00	CERAMIC	68PF	5%	50V
C22	1-101-888-00	CERAMIC	68PF	5%	50V
C23	1-101-004-00	CERAMIC	0.01MF		50V
C24	1-101-004-00	CERAMIC	0.01MF		50V
C25	1-101-888-00	CERAMIC	68PF	5%	50V
C26	1-101-888-00	CERAMIC	68PF	5%	50V
C27	1-101-004-00	CERAMIC	0.01MF		50V
C28	1-101-004-00	CERAMIC	0.01MF		50V
C29	1-101-888-00	CERAMIC	68PF	5%	50V
C30	1-101-888-00	CERAMIC	68PF	5%	50V
C31	1-101-004-00	CERAMIC	0.01MF		50V
C32	1-101-004-00	CERAMIC	0.01MF		50V
C33	1-101-888-00	CERAMIC	68PF	5%	50V
C34	1-101-888-00	CERAMIC	68PF	5%	50V
C35	1-101-004-00	CERAMIC	0.01MF		50V
C36	1-101-004-00	CERAMIC	0.01MF		50V
C37	1-101-888-00	CERAMIC	68PF	5%	50V
C44	1-101-004-00	CERAMIC	0.01MF		50V
C45	1-101-004-00	CERAMIC	0.01MF		50V
C46	1-123-356-00	ELECT	10MF	20%	16V
C47	1-124-122-11	ELECT	100MF	20%	16V
C49	1-102-965-00	CERAMIC	39PF	5%	50V
C50	1-136-165-00	FILM	0.1MF	5%	50V
C51	1-101-004-00	CERAMIC	0.01MF		50V
C52	1-101-004-00	CERAMIC	0.01MF		50V
C53	1-101-004-00	CERAMIC	0.01MF		50V
C55	1-102-961-00	CERAMIC	27PF	5%	50V
C56	1-101-004-00	CERAMIC	0.01MF		50V
C57	1-101-004-00	CERAMIC	0.01MF		50V
C62	1-101-004-00	CERAMIC	0.01MF		50V
C63	1-101-004-00	CERAMIC	0.01MF		50V
C64	1-101-004-00	CERAMIC	0.01MF		50V
C65	1-101-004-00	CERAMIC	0.01MF		50V
C66	1-101-004-00	CERAMIC	0.01MF		50V
C67	1-101-004-00	CERAMIC	0.01MF		50V

<COMPOSITION CIRCUIT BLOCK>

CP3	1-249-429-11	COMPOSITION CIRCUIT BLOCK
CP4	1-249-429-11	COMPOSITION CIRCUIT BLOCK

<DIODE>

D1	8-719-971-20	DIODE ERC38-06
D2	8-719-971-20	DIODE ERC38-06
D5	8-719-971-20	DIODE ERC38-06

<CONNECTOR>

DB1	*1-562-729-11	CONNECTOR, MULTI 64P
DB2	*1-561-724-00	SOCKET, CONNECTOR 2P
DB2	*1-564-431-11	POST, CONNECTOR 3P
DB3	*1-561-724-00	SOCKET, CONNECTOR 2P
DB3	*1-564-431-11	POST, CONNECTOR 3P

<IC>

IC1	8-759-982-23	IC RC78L08A
IC2	8-759-701-67	IC NJM79M08FA
IC3	8-759-107-33	IC UPC1060
IC7	8-759-990-82	IC TL082CP

DB DC

Ref. No.	Part No.	Description	Remark
IC8	8-759-990-82	IC TL082CP	
IC9	8-759-990-82	IC TL082CP	
IC10	8-759-990-82	IC TL082CP	
IC11	8-759-990-82	IC TL082CP	
IC14	8-759-773-16	IC TBP28L42N-H. PARA	
IC16	8-749-900-14	IC CP2005S	
IC17	8-749-900-14	IC CP2005S	
IC18	8-749-900-14	IC CP2005S	
IC19	8-759-773-16	IC TBP28L42N-H. PARA	
IC20	8-749-900-14	IC CP2005S	
IC21	8-749-900-14	IC CP2005S	
IC22	8-759-040-44	IC MC4044P	
IC23	8-759-040-24	IC MC4024P	
IC24	8-759-911-63	IC SN74S163N	
IC25	8-759-911-63	IC SN74S163N	
IC28	8-759-006-22	IC SN74LS283N	
IC29	8-759-006-22	IC SN74LS283N	
IC30	8-759-773-15	IC TBP28L42N-H. SIN	
IC31	8-759-900-08	IC SN74LS08N	
IC32	8-759-900-04	IC SN74LS04N	
IC33	8-759-982-21	IC RC78L05A	
IC34	8-759-903-92	IC SN74LS682N	
		<TRANSISTOR>	
Q7	8-729-119-78	TRANSISTOR 2SC2785-HFE	
		<RESISTOR>	
R7	1-215-431-00	METAL 2.7K 1% 1/6W	
R8	1-215-431-00	METAL 2.7K 1% 1/6W	
R9	1-215-431-00	METAL 2.7K 1% 1/6W	
R10	1-215-431-00	METAL 2.7K 1% 1/6W	
R11	1-215-437-00	METAL 4.7K 1% 1/6W	
R12	1-215-437-00	METAL 4.7K 1% 1/6W	
R13	1-215-437-00	METAL 4.7K 1% 1/6W	
R14	1-215-437-00	METAL 4.7K 1% 1/6W	
R15	1-215-437-00	METAL 4.7K 1% 1/6W	
R16	1-215-437-00	METAL 4.7K 1% 1/6W	
R17	1-215-437-00	METAL 4.7K 1% 1/6W	
R18	1-215-437-00	METAL 4.7K 1% 1/6W	
R19	1-215-437-00	METAL 4.7K 1% 1/6W	
R20	1-215-437-00	METAL 4.7K 1% 1/6W	
R21	1-215-437-00	METAL 4.7K 1% 1/6W	
R22	1-215-437-00	METAL 4.7K 1% 1/6W	
R23	1-215-437-00	METAL 4.7K 1% 1/6W	
R24	1-215-437-00	METAL 4.7K 1% 1/6W	
R25	1-215-437-00	METAL 4.7K 1% 1/6W	
R26	1-215-437-00	METAL 4.7K 1% 1/6W	
R47	1-215-429-00	METAL 2.2K 1% 1/6W	
R48	1-215-429-00	METAL 2.2K 1% 1/6W	
R49	1-215-429-00	METAL 2.2K 1% 1/6W	
R50	1-215-429-00	METAL 2.2K 1% 1/6W	
R51	1-215-429-00	METAL 2.2K 1% 1/6W	
R52	1-215-429-00	METAL 2.2K 1% 1/6W	
R53	1-215-429-00	METAL 2.2K 1% 1/6W	
R54	1-215-429-00	METAL 2.2K 1% 1/6W	
R55	1-215-429-00	METAL 2.2K 1% 1/6W	
R56	1-215-429-00	METAL 2.2K 1% 1/6W	
R57	1-249-426-11	CARBON 5.6K 5% 1/4W	
R58	1-249-424-11	CARBON 3.9K 5% 1/4W	
R59	1-249-417-11	CARBON 1K 5% 1/4W	
R60	1-249-417-11	CARBON 1K 5% 1/4W	
R61	1-249-420-11	CARBON 1.8K 5% 1/4W	
R62	1-249-396-11	CARBON 18 5% 1/4W	
R63	1-249-396-11	CARBON 18 5% 1/4W	
R66	1-249-417-11	CARBON 1K 5% 1/4W	
		<SWITCH>	
SW1	1-554-027-00	SWITCH, ROTARY	
SW4	1-516-923-21	SWITCH, DIP	
		**********	
	*A-1345-652-A	DC BOARD, COMPLETE **********	
	*4-353-708-00	HOOK, FINGER	
	4-378-915-01	NUT (M2.6), PLATE	
		<CAPACITOR>	
C1	1-101-361-00	CERAMIC 150PF 5% 50V	
C2	1-102-971-00	CERAMIC 82PF 5% 50V	
C3	1-101-004-00	CERAMIC 0.01MF 50V	
C4	1-101-004-00	CERAMIC 0.01MF 50V	
C5	1-101-361-00	CERAMIC 150PF 5% 50V	
C6	1-102-971-00	CERAMIC 82PF 5% 50V	
C7	1-101-004-00	CERAMIC 0.01MF 50V	
C8	1-101-004-00	CERAMIC 0.01MF 50V	
C14	1-102-973-00	CERAMIC 100PF 5% 50V	
C16	1-102-973-00	CERAMIC 100PF 5% 50V	
C17	1-102-973-00	CERAMIC 100PF 5% 50V	
C18	1-102-973-00	CERAMIC 100PF 5% 50V	
C19	1-101-004-00	CERAMIC 0.01MF 50V	
C20	1-101-004-00	CERAMIC 0.01MF 50V	
C21	1-101-004-00	CERAMIC 0.01MF 50V	
C22	1-101-004-00	CERAMIC 0.01MF 50V	
C23	1-101-004-00	CERAMIC 0.01MF 50V	
C24	1-101-004-00	CERAMIC 0.01MF 50V	
C25	1-101-004-00	CERAMIC 0.01MF 50V	
C29	1-123-356-00	ELECT 10MF 20% 16V	
C30	1-123-356-00	ELECT 10MF 20% 16V	
C33	1-123-321-00	ELECT 220MF 20% 16V	
C34	1-123-321-00	ELECT 220MF 20% 16V	
C35	1-123-321-00	ELECT 220MF 20% 16V	
C36	1-123-321-00	ELECT 220MF 20% 16V	
C37	1-101-004-00	CERAMIC 0.01MF 50V	
C38	1-101-004-00	CERAMIC 0.01MF 50V	
C39	1-101-004-00	CERAMIC 0.01MF 50V	
C40	1-101-004-00	CERAMIC 0.01MF 50V	
		<DIODE>	
D1	8-719-971-20	DIODE ERC38-06	
D2	8-719-971-20	DIODE ERC38-06	
D3	8-719-971-20	DIODE ERC38-06	
		<CONNECTOR>	
DC1	*1-562-729-11	CONNECTOR, MULTI 64P	
		<IC>	

Ref. No.	Part No.	Description	Remark
IC1	8-759-103-92	IC UPC318	
IC2	8-759-103-92	IC UPC318	
IC3	8-759-945-58	IC RC4558P	
IC4	8-759-945-58	IC RC4558P	
IC10	8-759-107-33	IC UPC1060	
IC11	8-759-982-23	IC RC78L08A	
IC12	8-759-701-67	IC NJM79M08FA	
IC13	8-759-032-85	IC MC74HC138AN	
IC14	8-759-032-85	IC MC74HC138AN	
IC15	8-759-032-85	IC MC74HC138AN	
IC16	8-759-032-85	IC MC74HC138AN	
IC17	8-759-032-85	IC MC74HC138AN	
IC18	8-759-032-85	IC MC74HC138AN	
IC19	8-759-916-46	IC SN74HC139N	
IC22	8-749-900-14	IC CP2005S	
IC23	8-749-900-14	IC CP2005S	
IC24	8-749-900-14	IC CP2005S	
IC25	8-749-900-14	IC CP2005S	
IC27	8-749-900-14	IC CP2005S	
IC28	8-749-900-14	IC CP2005S	
IC29	8-749-900-14	IC CP2005S	
IC30	8-749-900-14	IC CP2005S	
IC32	8-749-900-14	IC CP2005S	
IC34	8-749-900-14	IC CP2005S	
IC35	8-749-900-14	IC CP2005S	
IC41	8-749-900-14	IC CP2005S	
IC42	8-749-900-14	IC CP2005S	

<RESISTOR>

R7	1-215-431-00	METAL	2.7K	1%	1/6W
R8	1-215-431-00	METAL	2.7K	1%	1/6W
R9	1-215-431-00	METAL	2.7K	1%	1/6W
R10	1-215-431-00	METAL	2.7K	1%	1/6W
R11	1-215-427-00	METAL	1.8K	1%	1/6W
R12	1-215-427-00	METAL	1.8K	1%	1/6W
R13	1-215-431-00	METAL	2.7K	1%	1/6W
R15	1-215-431-00	METAL	2.7K	1%	1/6W
R17	1-215-401-11	METAL	150	1%	1/6W
R18	1-215-419-00	METAL	820	1%	1/6W
R20	1-215-425-00	METAL	1.5K	1%	1/6W
R21	1-215-413-00	METAL	470	1%	1/6W
R22	1-215-431-00	METAL	2.7K	1%	1/6W
R29	1-215-431-00	METAL	2.7K	1%	1/6W
R30	1-215-431-00	METAL	2.7K	1%	1/6W
R31	1-215-431-00	METAL	2.7K	1%	1/6W
R32	1-215-431-00	METAL	2.7K	1%	1/6W
R33	1-215-431-00	METAL	2.7K	1%	1/6W
R35	1-215-431-00	METAL	2.7K	1%	1/6W
R37	1-215-431-00	METAL	2.7K	1%	1/6W
R38	1-215-431-00	METAL	2.7K	1%	1/6W
R39	1-215-401-11	METAL	150	1%	1/6W
R40	1-215-419-00	METAL	820	1%	1/6W
R41	1-215-431-00	METAL	2.7K	1%	1/6W
R42	1-215-425-00	METAL	1.5K	1%	1/6W
R43	1-215-413-00	METAL	470	1%	1/6W
R63	1-215-435-00	METAL	3.9K	1%	1/6W
R64	1-215-435-00	METAL	3.9K	1%	1/6W
R65	1-215-439-00	METAL	5.6K	1%	1/6W
R66	1-215-439-00	METAL	5.6K	1%	1/6W
R67	1-215-395-00	METAL	82	1%	1/6W
R68	1-215-433-00	METAL	3.3K	1%	1/6W
R69	1-215-421-00	METAL	1K	1%	1/6W
R71	1-215-437-00	METAL	4.7K	1%	1/6W
R90	1-215-435-00	METAL	3.9K	1%	1/6W
R91	1-215-435-00	METAL	3.9K	1%	1/6W
R94	1-215-435-00	METAL	3.9K	1%	1/6W
R95	1-215-435-00	METAL	3.9K	1%	1/6W
R96	1-215-433-00	METAL	3.3K	1%	1/6W
R97	1-215-433-00	METAL	3.3K	1%	1/6W
R98	1-215-441-00	METAL	6.8K	1%	1/6W
R99	1-215-441-00	METAL	6.8K	1%	1/6W
R100	1-215-447-00	METAL	12K	1%	1/6W
R101	1-215-441-00	METAL	6.8K	1%	1/6W
R102	1-215-441-00	METAL	6.8K	1%	1/6W
R104	1-215-447-00	METAL	12K	1%	1/6W
R105	1-215-395-00	METAL	82	1%	1/6W
R106	1-215-433-00	METAL	3.3K	1%	1/6W
R107	1-215-437-00	METAL	4.7K	1%	1/6W
R108	1-215-421-00	METAL	1K	1%	1/6W
R110	1-215-445-00	METAL	10K	1%	1/6W
R111	1-215-445-00	METAL	10K	1%	1/6W

****

	*A-1345-835-A	E BOARD, COMPLETE
		**********
	3-701-609-00	BUSHING (B), TR
	*4-028-047-01	HEAT SINK, CLIP TYPE
	4-303-844-00	SPACER, MICA (4) MD-17
	*4-304-469-00	HOLDER
	*4-363-147-00	HEAT SINK, H.PIN
	*4-363-404-00	HOLDER, IC
	4-363-414-00	SPACER, MICA
	*4-373-965-01	INSULATOR (SMALL)
	*4-373-966-01	INSULATOR (LARGE)

<CAPACITOR>

C1	1-126-103-11	ELECT	470MF	20%	16V
C2	1-123-024-21	ELECT	33MF		160V
C3	1-124-126-00	ELECT	47MF	20%	25V
C4	1-102-125-00	CERAMIC	0.0047MF	10%	50V
C5	1-102-824-00	CERAMIC	470PF	5%	50V
C6	1-108-690-11	MYLAR	0.0068MF	10%	200V
C7	1-124-046-00	ELECT	10MF		160V
C8	1-102-030-00	CERAMIC	330PF	10%	500V
C9	1-136-165-00	FILM	0.1MF	5%	50V
C10	1-136-090-00	FILM	0.0062MF	3%	2KV
C11	1-136-318-11	FILM	0.0091MF	3%	2KV
C12	1-124-046-00	ELECT	10MF		160V
C13	1-126-101-11	ELECT	100MF	20%	16V
C14	1-126-101-11	ELECT	100MF	20%	16V
C15	1-108-626-11	MYLAR	0.01MF	10%	100V
C16	1-136-113-00	FILM	2MF	5%	200V
C17	1-136-155-00	FILM	0.015MF	5%	50V
C18	1-136-153-00	FILM	0.01MF	5%	50V
C19	1-102-030-00	CERAMIC	330PF	10%	500V
C20	1-136-111-00	FILM	1MF	5%	200V
C21	1-136-161-00	FILM	0.047MF	5%	50V
C22	1-126-105-11	ELECT	1000MF	20%	35V
C23	1-124-799-11	ELECT	2.2MF	20%	160V
C24	1-108-690-11	MYLAR	0.0068MF	10%	200V
C25	1-136-108-00	FILM	0.43MF	5%	200V

E

Ref. No.	Part No.	Description				Remark
C26	1-126-105-11	ELECT	1000MF	20%	35V	
C27	1-123-947-00	ELECT	10MF	20%	250V	
C28	1-126-174-51	ELECT	10MF	20%	350V	
C29	1-108-688-11	MYLAR	0.0047MF	10%	200V	
C30	1-162-115-00	CERAMIC	330PF	10%	2KV	
C31	1-124-046-00	ELECT	10MF		160V	
C32	1-124-126-00	ELECT	47MF	20%	25V	
C33	1-123-875-11	ELECT	10MF	20%	50V	
C34	1-123-875-11	ELECT	10MF	20%	50V	
C35	1-126-542-11	ELECT	4.7MF	20%	160V	
C36	1-102-973-00	CERAMIC	100PF	5%	50V	
C37	1-108-634-11	MYLAR	0.047MF	10%	100V	
C38	1-102-947-00	CERAMIC	10PF	0.5PF	50V	
C39	1-124-912-11	ELECT	330MF	20%	50V	
C40	1-124-912-11	ELECT	330MF	20%	50V	
C41	1-101-004-00	CERAMIC	0.01MF		50V	
C42	1-130-471-00	MYLAR	0.001MF	5%	50V	
C43	1-136-161-00	FILM	0.047MF	5%	50V	
C44	1-126-103-11	ELECT	470MF	20%	16V	
C45	1-102-228-00	CERAMIC	470PF	10%	500V	
C46	1-102-038-00	CERAMIC	0.001MF		500V	
C47	1-136-080-00	FILM	0.011MF	3%	2KV	
C48	1-136-111-00	FILM	1MF	5%	200V	
C49	1-136-161-00	FILM	0.047MF	5%	50V	
C50	1-136-111-00	FILM	1MF	5%	200V	
C51	1-123-024-21	ELECT	33MF		160V	
C52	1-126-103-11	ELECT	470MF	20%	16V	
C53	1-124-634-11	ELECT	1MF	20%	450V	
C54	1-124-798-11	ELECT	1MF	20%	160V	
C55	1-124-798-11	ELECT	1MF	20%	160V	
C56	1-130-473-00	MYLAR	0.0015MF	5%	50V	
C57	1-136-153-00	FILM	0.01MF	5%	50V	
C58	1-124-126-00	ELECT	47MF	20%	25V	
C59	1-130-479-00	MYLAR	0.0047MF	5%	50V	
C60	1-136-165-00	FILM	0.1MF	5%	50V	
C61	1-101-004-00	CERAMIC	0.01MF		50V	
C62	1-130-471-00	MYLAR	0.001MF	5%	50V	
C63	1-102-973-00	CERAMIC	100PF	5%	50V	
C64	1-102-824-00	CERAMIC	470PF	5%	50V	
C65	1-123-875-11	ELECT	10MF	20%	50V	
C66	1-126-233-11	ELECT	22MF	20%	50V	
C67	1-126-233-11	ELECT	22MF	20%	50V	
C68	1-136-165-00	FILM	0.1MF	5%	50V	
C69	1-136-165-00	FILM	0.1MF	5%	50V	
C70	1-123-875-11	ELECT	10MF	20%	50V	
C71	1-123-381-00	ELECT	2.2MF	20%	50V	
C72	1-102-824-00	CERAMIC	470PF	5%	50V	
C73	1-136-171-00	FILM	0.33MF	5%	50V	
C74	1-126-335-11	ELECT	220MF	20%	10V	
C75	1-101-004-00	CERAMIC	0.01MF		50V	
C76	1-126-101-11	ELECT	100MF	20%	16V	
C77	1-124-036-95	ELECT	330MF	20%	16V	
C78	1-126-163-11	ELECT	4.7MF	20%	50V	
C79	1-108-638-11	MYLAR	0.1MF	10%	100V	
C80	1-124-791-11	ELECT	1MF	20%	50V	
C81	1-124-126-00	ELECT	47MF	20%	16V	
C82	1-102-110-00	CERAMIC	220PF	10%	50V	
C83	1-136-165-00	FILM	0.1MF	5%	50V	
C84	1-123-321-00	ELECT	220MF	20%	16V	
C85	1-136-165-00	FILM	0.1MF	5%	50V	
C86	1-123-875-11	ELECT	10MF	20%	50V	
C87	1-136-165-00	FILM	0.1MF	5%	50V	
C88	1-136-165-00	FILM	0.1MF	5%	50V	
C90	1-108-696-11	MYLAR	0.022MF	10%	200V	
C95	1-108-628-11	MYLAR	0.015MF	10%	100V	
C97	1-124-282-00	ELECT	22MF	20%	16V	
C98	1-136-065-00	FILM	0.0027MF	3%	2KV	
C99	1-129-716-00	FILM	0.015MF	10%	630V	
C100	1-129-715-00	FILM	0.012MF	10%	630V	
C101	1-136-541-11	FILM	1.5MF	5%	200V	
C103	1-130-479-00	MYLAR	0.0047MF	5%	50V	
C104	1-130-479-00	MYLAR	0.0047MF	5%	50V	
C105	1-126-542-11	ELECT	4.7MF	20%	160V	
C106	1-124-046-00	ELECT	10MF		160V	
C107	1-136-113-00	FILM	2MF	5%	200V	
C108	1-124-126-00	ELECT	47MF	20%	16V	
C110	1-124-126-00	ELECT	47MF	20%	16V	
C112	1-162-318-11	CERAMIC	0.001MF	10%	500V	
C113	1-162-318-11	CERAMIC	0.001MF	10%	500V	
C114	1-136-153-00	FILM	0.01MF	5%	50V	
C115	1-101-004-00	CERAMIC	0.01MF		50V	
C116	1-126-101-11	ELECT	100MF	20%	16V	
C117	1-126-101-11	ELECT	100MF	20%	16V	
C118	1-102-971-00	CERAMIC	82PF	5%	50V	
C119	1-101-004-00	CERAMIC	0.01MF		50V	
C120	1-124-513-11	ELECT	47MF	20%	50V	
C121	1-136-153-00	FILM	0.01MF	5%	50V	
C122	1-136-157-00	FILM	0.022MF	5%	50V	
C123	1-124-513-11	ELECT	47MF	20%	50V	
C124	1-101-004-00	CERAMIC	0.01MF		50V	
C125	1-123-875-11	ELECT	10MF	20%	50V	
C126	1-124-443-00	ELECT	100MF	20%	6.3V	
C127	1-101-004-00	CERAMIC	0.01MF		50V	
C128	1-101-004-00	CERAMIC	0.01MF		50V	
C129	1-123-875-11	ELECT	10MF	20%	50V	
C130	1-124-443-00	ELECT	100MF	20%	6.3V	
C133	1-124-126-00	ELECT	47MF	20%	16V	
C134	1-124-126-00	ELECT	47MF	20%	16V	
C135	1-162-318-11	CERAMIC	0.001MF	10%	500V	
C136	1-102-228-00	CERAMIC	470PF	10%	500V	
C137	1-102-228-00	CERAMIC	470PF	10%	500V	
C140	1-102-074-00	CERAMIC	0.001MF	10%	50V	

<DIODE>

D1	8-719-911-19	DIODE 1SS119
D2	8-719-300-76	DIODE RH-1A
D3	8-719-300-76	DIODE RH-1A
D4	8-719-973-95	DIODE ERD09-15
D5	8-719-928-08	DIODE ERD28-08S
D6	8-719-971-20	DIODE ERC38-06
D7	8-719-971-20	DIODE ERC38-06
D8	8-719-911-19	DIODE 1SS119
D9	8-719-911-19	DIODE 1SS119
D10	8-719-911-19	DIODE 1SS119
D11	8-719-911-19	DIODE 1SS119
D12	8-719-911-19	DIODE 1SS119
D13	8-719-300-76	DIODE RH-1A
D14	8-719-300-76	DIODE RH-1A
D15	8-719-000-28	THYRISTOR CR02AM-8
D16	8-719-931-04	DIODE ERD31-04
D17	8-719-931-04	DIODE ERD31-04
D18	8-719-971-20	DIODE ERC38-06

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Replace only with part number specified.

Les composants identifies par une trame et une marque ⚠ sont critiques pour la securite.
Ne les remplacer que par une piece portant le numero specifie.

• The components identified by ⊠ in this manual have been carefully factory-selected for each set in order to satisfy regulations regarding X-ray radiation. Should replacement be required, replace only with the value originally used.

E

Ref. No.	Part No.	Description	Remark
D19	8-719-971-20	DIODE ERC38-06	
D20	8-719-971-20	DIODE ERC38-06	
D21	8-719-911-19	DIODE 1SS119	
D22	8-719-911-19	DIODE 1SS119	
D23	8-719-911-19	DIODE 1SS119	
D24	8-719-911-19	DIODE 1SS119	
D25	8-719-911-19	DIODE 1SS119	
D26	8-719-931-04	DIODE ERD31-04	
D27	8-719-931-04	DIODE ERD31-04	
D28	8-719-300-76	DIODE RH-1A	
D29	8-719-928-08	DIODE ERD28-08S	
D30	8-719-928-08	DIODE ERD28-08S	
D31	8-719-931-04	DIODE ERD31-04	
D32	8-719-901-19	DIODE V11N	
D33	8-759-157-40	DIODE UPC754J	
D34	8-759-157-40	DIODE UPC754J	
D35	8-759-157-40	DIODE UPC754J	
D36	8-759-157-40	DIODE UPC754J	
D37	8-719-911-19	DIODE 1SS119	
D38	8-719-911-19	DIODE 1SS119	
D39	8-759-157-40	DIODE UPC754J	
D40 ⊠⚠	8-759-157-42	DIODE HZT33-02	
D41	8-719-911-19	DIODE 1SS119	
D42	8-719-911-19	DIODE 1SS119	
D43	8-719-911-19	DIODE 1SS119	
D44	8-719-911-19	DIODE 1SS119	
D45	8-719-000-28	THYRISTOR CR02AM-8	
D46	8-719-971-20	DIODE ERC38-06	
D47	8-719-911-19	DIODE 1SS119	
D48	8-719-154-58	DIODE RD6.2EL2	
D49	8-719-911-19	DIODE 1SS119	
D50	8-719-300-76	DIODE RH-1A	
D51	8-719-154-73	DIODE RD10EL2	
D52	8-719-154-73	DIODE RD10EL2	
D53	8-719-911-19	DIODE 1SS119	
D54	8-719-911-19	DIODE 1SS119	
D57	8-726-420-00	THYRISTOR SG-264	
D58	8-719-971-20	DIODE ERC38-06	
D60	8-719-928-08	DIODE ERD28-08S	
D61	8-719-928-08	DIODE ERD28-08S	
D62	8-719-911-19	DIODE 1SS119	
D63	8-719-945-80	DIODE ERC06-15S	
D65	8-719-911-19	DIODE 1SS119	
D66	8-719-911-19	DIODE 1SS119	
D67	8-719-911-19	DIODE 1SS119	
D68	8-719-911-19	DIODE 1SS119	
D69	8-719-110-39	DIODE RD15ESB1	
D70	8-719-110-39	DIODE RD15ESB1	
D71	8-719-911-19	DIODE 1SS119	
D72	8-719-911-19	DIODE 1SS119	
D73	8-719-000-28	THYRISTOR CR02AM-8	
D74	8-719-911-19	DIODE 1SS119	
D75	8-719-000-28	THYRISTOR CR02AM-8	
D76	8-719-000-28	THYRISTOR CR02AM-8	
D77	8-719-911-19	DIODE 1SS119	
D80	8-719-928-08	DIODE ERD28-08S	
D81	8-719-973-95	DIODE ERD09-15	

<CONNECTOR>

E1	*1-566-059-11	PIN, CONNECTOR 7P	
E2	*1-566-056-11	PIN, CONNECTOR 4P	
E3	*1-566-056-11	PIN, CONNECTOR 4P	
E4	*1-508-767-00	PIN, CONNECTOR (5MM PITCH) 5P	
E5	*1-508-767-00	PIN, CONNECTOR (5MM PITCH) 5P	
E6	*1-508-784-00	PIN, CONNECTOR (5MM PITCH) 1P	
E7	*1-508-766-00	PIN, CONNECTOR (5MM PITCH) 4P	
E8	*1-566-054-11	PIN, CONNECTOR 2P	
E9	*1-566-054-11	PIN, CONNECTOR 2P	
E10	*1-566-055-11	PIN, CONNECTOR 3P	
E11	*1-566-058-11	PIN, CONNECTOR 6P	
E12	*1-566-054-11	PIN, CONNECTOR 2P	
E13	*1-566-054-11	PIN, CONNECTOR 2P	
E14	*1-508-766-00	PIN, CONNECTOR (5MM PITCH) 4P	
E15	*1-566-055-11	PIN, CONNECTOR 3P	
E16	*1-566-054-11	PIN, CONNECTOR 2P	
E17	*1-566-059-11	PIN, CONNECTOR 7P	
E19	*1-566-054-11	PIN, CONNECTOR 2P	
E20	*1-566-056-11	PIN, CONNECTOR 4P	
E21	*1-566-055-11	PIN, CONNECTOR 3P	
E23	*1-566-055-11	PIN, CONNECTOR 3P	

<IC>

IC1	8-759-945-58	IC RC4558P	
IC2	8-759-981-64	IC LM2903DQ	
IC3	8-759-945-58	IC RC4558P	
IC4	8-759-981-64	IC LM2903DQ	
IC5	8-759-981-64	IC LM2903DQ	
IC6	8-759-981-64	IC LM2903DQ	
IC7	8-759-945-58	IC RC4558P	
IC8	8-759-103-92	IC UPC318	

<COIL>

L1	1-459-148-00	COIL	
L2	1-459-975-11	COIL, HORIZONTAL LINEARITY	
L3	1-459-075-00	COIL, DYNAMIC CONVERSION CHOKE	
L5	1-421-603-11	COIL, FERRITE CHOKE	
L6	1-407-365-00	COIL, CHOKE	
L7	1-459-110-00	COIL, DUST CORE	
L8	1-408-697-00	COIL, CHOKE	

<TRANSISTOR>

Q1	8-729-140-50	TRANSISTOR 2SC3209-LK	
Q2	8-729-304-26	TRANSISTOR 2SC3263-O	
Q3	8-729-140-50	TRANSISTOR 2SC3209-LK	
Q4	8-729-313-82	TRANSISTOR 2SD1138	
Q5	8-729-820-34	TRANSISTOR 2SC3995	
Q6	8-729-300-70	TRANSISTOR 2SD1137	
Q7	8-729-300-80	TRANSISTOR 2SB860	
Q8	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q9	8-729-697-92	TRANSISTOR 2SA979-G	
Q10	8-729-309-08	TRANSISTOR 2SC1890A-E	
Q11	8-729-300-70	TRANSISTOR 2SD1137	
Q12	8-729-309-08	TRANSISTOR 2SC1890A-E	
Q13	8-729-309-36	TRANSISTOR 2SA893A-E	
Q14	8-729-300-80	TRANSISTOR 2SB860	
Q15	8-729-201-05	TRANSISTOR 2SC2878-B	
Q16	8-729-800-32	TRANSISTOR 2SC2362K-G	
Q17	8-729-800-32	TRANSISTOR 2SC2362K-G	
Q18	8-729-309-08	TRANSISTOR 2SC1890A-E	
Q19	8-729-306-92	TRANSISTOR 2SD669A-C	

E

Ref. No.	Part No.	Description	Remark
Q20	8-729-309-36	TRANSISTOR 2SA893A-E	
Q21	8-729-306-92	TRANSISTOR 2SD669A-C	
Q22	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q23	8-729-697-92	TRANSISTOR 2SA979-G	
Q24	8-729-904-98	TRANSISTOR 2SC4054P	
Q25	8-729-306-92	TRANSISTOR 2SD669A-C	
Q26	8-729-309-08	TRANSISTOR 2SC1890A-E	
Q27	8-729-309-36	TRANSISTOR 2SA893A-E	
Q28	8-729-306-92	TRANSISTOR 2SD669A-C	
Q29	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q30	8-729-320-62	TRANSISTOR 2SD789-34	
Q31	8-729-301-56	TRANSISTOR 2SC3387-01A	
Q32	8-729-374-02	TRANSISTOR 2SB740-3	
Q33	8-729-105-97	TRANSISTOR 2SA1156-2K	
Q34	8-729-140-50	TRANSISTOR 2SC3209-LK	
Q35	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q36	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q37	8-729-201-05	TRANSISTOR 2SC2878-B	
Q38	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q39	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q40	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q41	8-729-133-53	TRANSISTOR 2SC2335-K	
Q42	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q43	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q44	8-729-304-92	TRANSISTOR 2SB649A-C	
Q45	8-729-306-92	TRANSISTOR 2SD669A-C	
Q46	8-729-300-70	TRANSISTOR 2SD1137	
Q47	8-729-300-80	TRANSISTOR 2SB860	
Q48	8-729-122-12	TRANSISTOR 2SA1221-L	
Q49	8-729-122-12	TRANSISTOR 2SA1221-L	

<RESISTOR>

Ref. No.	Part No.	Description				Remark
R1	1-215-461-00	METAL	47K	1%	1/6W	
R2	1-215-461-00	METAL	47K	1%	1/6W	
R3	1-249-441-11	CARBON	100K	5%	1/4W	
R4	1-249-413-11	CARBON	470	5%	1/4W	
R5	1-249-417-11	CARBON	1K	5%	1/4W	
R6	1-249-417-11	CARBON	1K	5%	1/4W	
R7	1-215-875-11	METAL OXIDE	10K	5%	1W	F
R8	1-215-876-00	METAL OXIDE	15K	5%	1W	F
R9	1-214-892-00	METAL	15K	1%	1/2W	
R10	1-214-892-00	METAL	15K	1%	1/2W	
R11	1-215-437-00	METAL	4.7K	1%	1/6W	
R12	1-249-401-11	CARBON	47	5%	1/4W	
R14	1-249-415-11	CARBON	680	5%	1/4W	
R15	1-215-915-11	METAL OXIDE	470	5%	3W	F
R16	1-215-871-11	METAL OXIDE	2.2K	5%	1W	F
R17	1-207-451-00	WIREWOUND	0.1	10%	1/2W	
R18	1-249-389-11	CARBON	4.7	5%	1/4W	F
R19	1-249-382-11	CARBON	1.2	5%	1/4W	F
R20	1-249-382-11	CARBON	1.2	5%	1/4W	F
R21	1-249-417-11	CARBON	1K	5%	1/4W	
R22	1-249-417-11	CARBON	1K	5%	1/4W	
R23	1-216-357-00	METAL OXIDE	4.7	5%	1W	F
R24	1-216-357-00	METAL OXIDE	4.7	5%	1W	F
R25	1-215-865-11	METAL OXIDE	220	5%	1W	F
R26	1-216-478-11	METAL OXIDE	390	5%	3W	F
R27	1-249-423-11	CARBON	3.3K	5%	1/4W	
R28	1-249-425-11	CARBON	4.7K	5%	1/4W	
R29	1-249-419-11	CARBON	1.5K	5%	1/4W	
R30	1-215-433-00	METAL	3.3K	1%	1/6W	
R31	1-215-445-00	METAL	10K	1%	1/6W	
R32	1-249-417-11	CARBON	1K	5%	1/4W	
R33	1-249-417-11	CARBON	1K	5%	1/4W	
R34	1-215-437-00	METAL	4.7K	1%	1/6W	
R35	1-249-406-11	CARBON	120	5%	1/4W	
R36	1-215-925-11	METAL OXIDE	22K	5%	3W	F
R37	1-249-405-11	CARBON	100	5%	1/4W	
R38	1-249-377-11	CARBON	0.47	5%	1/4W	F
R39	1-249-377-11	CARBON	0.47	5%	1/4W	F
R40	1-249-417-11	CARBON	1K	5%	1/4W	
R41	1-249-413-11	CARBON	470	5%	1/4W	
R42	1-216-349-00	METAL OXIDE	1	5%	1W	F
R43	1-215-859-00	METAL OXIDE	22	5%	1W	F
R44	1-215-870-11	METAL OXIDE	1.5K	5%	1W	F
R45	1-215-869-11	METAL OXIDE	1K	5%	1W	F
R46	1-216-478-11	METAL OXIDE	390	5%	3W	F
R47	1-215-869-11	METAL OXIDE	1K	5%	1W	F
R48	1-215-425-00	METAL	1.5K	1%	1/6W	
R49	1-216-349-00	METAL OXIDE	1	5%	1W	F
R50	1-215-437-00	METAL	4.7K	1%	1/6W	
R51	1-216-349-00	METAL OXIDE	1	5%	1W	F
R52	1-249-429-11	CARBON	10K	5%	1/4W	
R53	1-247-902-11	CARBON	910K	5%	1/4W	
R54	1-247-883-00	CARBON	150K	5%	1/4W	
R55	1-249-433-11	CARBON	22K	5%	1/4W	
R56	1-249-420-11	CARBON	1.8K	5%	1/4W	
R57	1-249-421-11	CARBON	2.2K	5%	1/4W	F
R58	1-249-429-11	CARBON	10K	5%	1/4W	
R59	1-249-425-11	CARBON	4.7K	5%	1/4W	
R60	1-249-417-11	CARBON	1K	5%	1/4W	
R61	1-249-418-11	CARBON	1.2K	5%	1/4W	
R62	1-215-863-11	METAL OXIDE	100	5%	1W	F
R63	1-215-421-00	METAL	1K	1%	1/6W	
R64	1-215-445-00	METAL	10K	1%	1/6W	
R65	1-249-420-11	CARBON	1.8K	5%	1/4W	
R66	1-215-878-00	METAL OXIDE	33K	5%	1W	F
R67	1-249-401-11	CARBON	47	5%	1/4W	
R68	1-249-425-11	CARBON	4.7K	5%	1/4W	
R69	1-215-461-00	METAL	47K	1%	1/6W	
R70	1-215-453-00	METAL	22K	1%	1/6W	
R71	1-215-429-00	METAL	2.2K	1%	1/6W	
R72	1-247-688-11	CARBON	10	5%	1/4W	F
R73	1-247-688-11	CARBON	10	5%	1/4W	F
R74	1-247-688-11	CARBON	10	5%	1/4W	F
R75	1-249-423-11	CARBON	3.3K	5%	1/4W	
R76	1-249-425-11	CARBON	4.7K	5%	1/4W	
R77	1-249-417-11	CARBON	1K	5%	1/4W	
R78	1-215-437-00	METAL	4.7K	1%	1/6W	
R79	1-215-437-00	METAL	4.7K	1%	1/6W	
R80	1-249-417-11	CARBON	1K	5%	1/4W	
R81	1-249-417-11	CARBON	1K	5%	1/4W	
R82	1-249-405-11	CARBON	100	5%	1/4W	
R83	1-249-421-11	CARBON	2.2K	5%	1/4W	
R84	1-249-426-11	CARBON	5.6K	5%	1/4W	
R85	1-249-452-11	CARBON	2.7	5%	1/4W	F
R86	1-249-452-11	CARBON	2.7	5%	1/4W	F
R87	1-215-863-11	METAL OXIDE	100	5%	1W	F
R88	1-216-349-00	METAL OXIDE	1	5%	1W	F
R89	1-216-353-00	METAL OXIDE	2.2	5%	1W	F
R90	1-216-353-00	METAL OXIDE	2.2	5%	1W	F
R91	1-247-881-00	CARBON	120K	5%	1/4W	

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E

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R92	1-249-425-11	CARBON	4.7K	5%	1/4W	
R93	1-249-417-11	CARBON	1K	5%	1/4W	
R94	1-249-421-11	CARBON	2.2K	5%	1/4W	
R95	1-249-429-11	CARBON	10K	5%	1/4W	
R96	1-249-417-11	CARBON	1K	5%	1/4W	
R97	1-249-421-11	CARBON	2.2K	5%	1/4W	
R98	1-249-421-11	CARBON	2.2K	5%	1/4W	
R99	1-249-421-11	CARBON	2.2K	5%	1/4W	
R100	1-249-400-11	CARBON	39	5%	1/4W	
R101	1-249-417-11	CARBON	1K	5%	1/4W	
R102	1-215-857-11	METAL OXIDE	10	5%	1W	F
R103	1-249-421-11	CARBON	2.2K	5%	1/4W	
R104	1-216-350-11	METAL OXIDE	1.2	5%	1W	F
R105	1-215-860-11	METAL OXIDE	33	5%	1W	F
R106	1-215-863-11	METAL OXIDE	100	5%	1W	F
R107	1-215-863-11	METAL OXIDE	100	5%	1W	F
R108	1-216-345-11	METAL OXIDE	0.47	5%	1W	F
R109	1-215-869-11	METAL OXIDE	1K	5%	1W	F
R110	1-215-902-11	METAL OXIDE	47K	5%	1W	F
R111	1-216-461-00	METAL OXIDE	5.6K	5%	2W	F
R112	1-249-405-11	CARBON	100	5%	1/4W	
R113	1-249-429-11	CARBON	10K	5%	1/4W	
R114⧓⚠		METAL			1/6W	
R115⧓⚠		METAL			1/6W	
R116	1-215-445-00	METAL	10K	1%	1/6W	
R117	1-249-421-11	CARBON	2.2K	5%	1/4W	
R118	1-249-429-11	CARBON	10K	5%	1/4W	
R119	1-247-883-00	CARBON	150K	5%	1/4W	
R120	1-249-417-11	CARBON	1K	5%	1/4W	
R121	1-249-425-11	CARBON	4.7K	5%	1/4W	
R122	1-249-421-11	CARBON	2.2K	5%	1/4W	
R123	1-249-433-11	CARBON	22K	5%	1/4W	
R124	1-249-421-11	CARBON	2.2K	5%	1/4W	
R125	1-249-441-11	CARBON	100K	5%	1/4W	
R126	1-249-425-11	CARBON	4.7K	5%	1/4W	
R127	1-249-425-11	CARBON	4.7K	5%	1/4W	
R128	1-249-429-11	CARBON	10K	5%	1/4W	
R129	1-215-875-11	METAL OXIDE	10K	5%	1W	F
R130	1-215-875-11	METAL OXIDE	10K	5%	1W	F
R131	1-215-875-11	METAL OXIDE	10K	5%	1W	F
R132	1-215-875-11	METAL OXIDE	10K	5%	1W	F
R133	1-249-417-11	CARBON	1K	5%	1/4W	
R134	⚠1-215-433-00	METAL	3.3K	1%	1/6W	
R135	⚠1-215-433-00	METAL	3.3K	1%	1/6W	
R136	⚠1-215-433-00	METAL	3.3K	1%	1/6W	
R137	1-215-461-00	METAL	47K	1%	1/6W	
R138	1-249-417-11	CARBON	1K	5%	1/4W	
R139	1-249-417-11	CARBON	1K	5%	1/4W	
R140⧓⚠		METAL			1/6W	
R141⧓⚠		METAL			1/6W	
R142	1-247-887-00	CARBON	220K	5%	1/4W	
R143	1-247-887-00	CARBON	220K	5%	1/4W	
R144	1-215-445-00	METAL	10K	1%	1/6W	
R145	1-249-441-11	CARBON	100K	5%	1/4W	
R146	1-249-417-11	CARBON	1K	5%	1/4W	
R147	1-249-439-11	CARBON	68K	5%	1/4W	
R148	1-249-437-11	CARBON	47K	5%	1/4W	
R149	1-249-426-11	CARBON	5.6K	5%	1/4W	
R150	1-249-421-11	CARBON	2.2K	5%	1/4W	
R151	1-249-435-11	CARBON	33K	5%	1/4W	
R152	1-249-417-11	CARBON	1K	5%	1/4W	
R153	1-247-895-00	CARBON	470K	5%	1/4W	

Ref. No.	Part No.	Description				Remark
R154	1-249-429-11	CARBON	10K	5%	1/4W	
R155	1-215-477-00	METAL	220K	1%	1/6W	
R156	1-215-485-00	METAL	470K	1%	1/6W	
R157	1-249-437-11	CARBON	47K	5%	1/4W	
R158	1-249-425-11	CARBON	4.7K	5%	1/4W	
R159	1-216-354-11	METAL OXIDE	2.7	5%	1W	F
R161	1-249-425-11	CARBON	4.7K	5%	1/4W	
R162	1-249-429-11	CARBON	10K	5%	1/4W	
R163	1-249-429-11	CARBON	10K	5%	1/4W	
R164	1-249-429-11	CARBON	10K	5%	1/4W	
R165	1-249-405-11	CARBON	100	5%	1/4W	
R166	1-249-429-11	CARBON	10K	5%	1/4W	
R167	1-249-417-11	CARBON	1K	5%	1/4W	
R168	1-249-425-11	CARBON	4.7K	5%	1/4W	
R170	1-249-417-11	CARBON	1K	5%	1/4W	
R171	1-249-429-11	CARBON	10K	5%	1/4W	
R172	1-249-405-11	CARBON	100	5%	1/4W	
R173	1-249-429-11	CARBON	10K	5%	1/4W	
R174	1-215-859-00	METAL OXIDE	22	5%	1W	F
R175	1-215-421-00	METAL	1K	1%	1/6W	
R176	1-215-421-00	METAL	1K	1%	1/6W	
R180	1-249-417-11	CARBON	1K	5%	1/4W	
R182	⚠1-215-433-00	METAL	3.3K	1%	1/6W	
R183⧓⚠		METAL			1/6W	
R184	1-215-453-00	METAL	22K	1%	1/6W	
R185	1-249-405-11	CARBON	100	5%	1/4W	
R190	1-215-445-00	METAL	10K	1%	1/6W	
R191	1-215-421-00	METAL	1K	1%	1/6W	
R192	1-215-445-00	METAL	10K	1%	1/6W	
R193	1-215-445-00	METAL	10K	1%	1/6W	
R194	1-215-459-00	METAL	39K	1%	1/6W	
R195	1-215-445-00	METAL	10K	1%	1/6W	
R196	1-249-417-11	CARBON	1K	5%	1/4W	
R197	1-215-445-00	METAL	10K	1%	1/6W	
R198	1-215-457-00	METAL	33K	1%	1/6W	
R199	1-249-425-11	CARBON	4.7K	5%	1/4W	
R200	1-249-405-11	CARBON	100	5%	1/4W	
R201	1-249-429-11	CARBON	10K	5%	1/4W	
R202	1-216-369-00	METAL OXIDE	1	5%	2W	F
R203	1-216-393-00	METAL OXIDE	2.2	5%	3W	F
R204	1-249-429-11	CARBON	10K	5%	1/4W	
R205	1-249-401-11	CARBON	47	5%	1/4W	
R206	1-249-401-11	CARBON	47	5%	1/4W	
R207	1-215-429-00	METAL	2.2K	1%	1/6W	
R208	1-215-421-00	METAL	1K	1%	1/6W	
R209	1-215-421-00	METAL	1K	1%	1/6W	
R210	1-249-432-11	CARBON	18K	5%	1/4W	
R211	1-215-443-00	METAL	8.2K	1%	1/6W	
R212	1-249-414-11	CARBON	560	5%	1/4W	F
R213	1-249-428-11	CARBON	8.2K	5%	1/4W	
R214	1-249-412-11	CARBON	390	5%	1/4W	
R215	1-249-415-11	CARBON	680	5%	1/4W	F
R216	1-249-403-11	CARBON	68	5%	1/4W	F
R217	1-249-405-11	CARBON	100	5%	1/4W	F
R218	1-216-349-00	METAL OXIDE	1	5%	1W	F
R219	1-216-349-00	METAL OXIDE	1	5%	1W	F
R220	1-216-451-11	METAL OXIDE	120	5%	2W	F
R221	1-216-349-00	METAL OXIDE	1	5%	1W	F
R222	1-249-417-11	CARBON	1K	5%	1/4W	
R223	1-215-425-00	METAL	1.5K	1%	1/6W	
R224	1-215-461-00	METAL	47K	1%	1/6W	
R225	1-215-461-00	METAL	47K	1%	1/6W	

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Ref. No.	Part No.	Description				Remark
R226	1-249-441-11	CARBON	100K	5%	1/4W	
R227	1-249-429-11	CARBON	10K	5%	1/4W	
R228	1-249-429-11	CARBON	10K	5%	1/4W	
R229	1-249-437-11	CARBON	47K	5%	1/4W	
R230	1-249-437-11	CARBON	47K	5%	1/4W	
R231	1-216-389-11	METAL OXIDE	1	5%	3W	F
R233	1-249-417-11	CARBON	1K	5%	1/4W	
R234	1-216-389-11	METAL OXIDE	1	5%	3W	F
R235	1-249-437-11	CARBON	47K	5%	1/4W	
R236	1-249-437-11	CARBON	47K	5%	1/4W	
R237	1-249-429-11	CARBON	10K	5%	1/4W	
R238	1-249-441-11	CARBON	100K	5%	1/4W	
R239	1-249-429-11	CARBON	10K	5%	1/4W	
R240	1-215-421-00	METAL	1K	1%	1/6W	
R241	1-215-461-00	METAL	47K	1%	1/6W	
R242	1-215-461-00	METAL	47K	1%	1/6W	
R245	1-215-915-11	METAL OXIDE	470	5%	3W	F
R250	1-249-429-11	CARBON	10K	5%	1/4W	
R251	1-249-429-11	CARBON	10K	5%	1/4W	
R252	1-249-401-11	CARBON	47	5%	1/4W	
R253	1-249-405-11	CARBON	100	5%	1/4W	
R255	1-249-417-11	CARBON	1K	5%	1/4W	
R256	1-215-857-11	METAL OXIDE	10	5%	1W	F
R260	1-249-397-11	CARBON	22	5%	1/4W	
R300	1-249-385-11	CARBON	2.2	5%	1/4W	
R301	1-249-385-11	CARBON	2.2	5%	1/4W	
R302	1-249-385-11	CARBON	2.2	5%	1/4W	
		<VARIABLE RESISTOR>				
RV2	1-237-516-21	RES, ADJ, CERMET 2K				
RV3	1-237-518-21	RES, ADJ, CERMET 10K				
		<RELAY>				
RY1	1-515-627-11	RELAY				
		<SPARK GAP>				
SG1	1-519-063-99	DISCHARGING GAP				
SG2	1-519-063-99	DISCHARGING GAP				
		<TRANSFORMER>				
T1	1-437-144-11	TRANSFORMER, FERRITE (HDT)				
T2	1-424-123-11	TRANSFORMER, HORIZONTAL OUTPUT				
T3	1-421-602-11	TRANSFORMER, FERRITE (VPCT)				
T4	1-407-849-00	TRANSFORMER, D.F				
T5	1-437-133-11	TRANSFORMER, FERRITE (HDT)				
T6	1-439-380-11	LOT				
T7	1-424-124-11	TRANSFORMER, PIN MODULATION				
**********						
	*A-1345-836-A	D BOARD, COMPLETE				
		**********				
		<CAPACITOR>				
C1	1-102-978-00	CERAMIC	220PF	5%	50V	
C2	1-102-973-00	CERAMIC	100PF	5%	50V	
C3	1-130-871-11	FILM	0.01MF	5%	50V	
C4	1-136-161-00	FILM	0.047MF	5%	50V	
C5	1-124-589-11	ELECT	47MF	20%	16V	
C6	1-130-471-00	FILM	0.001MF	5%	50V	
C7	1-124-589-11	ELECT	47MF	20%	16V	
C8	1-124-589-11	ELECT	47MF	20%	16V	
C9	1-126-163-11	ELECT	4.7MF	20%	25V	
C10	1-136-153-00	FILM	0.01MF	5%	50V	
C11	1-136-153-00	FILM	0.01MF	5%	50V	
C12	1-126-157-11	ELECT	10MF	20%	16V	
C13	1-136-157-00	FILM	0.022MF	5%	50V	
C14	1-124-257-00	ELECT	2.2MF	20%	50V	
C15	1-130-726-00	FILM	0.0015MF	5%	50V	
C16	1-136-173-00	FILM	0.47MF	5%	50V	
C17	1-126-157-11	ELECT	10MF	20%	16V	
C18	1-136-157-00	FILM	0.022MF	5%	50V	
C19	1-124-589-11	ELECT	47MF	20%	16V	
C20	1-124-589-11	ELECT	47MF	20%	16V	
C21	1-124-589-11	ELECT	47MF	20%	16V	
C22	1-124-589-11	ELECT	47MF	20%	16V	
C23	1-101-004-00	CERAMIC	0.01MF		50V	
C24	1-130-871-11	FILM	0.01MF	5%	50V	
C25	1-124-589-11	ELECT	47MF	20%	16V	
C29	1-136-474-11	FILM	0.1MF	5%	100V	
C30	1-130-871-11	FILM	0.01MF	5%	50V	
C31	1-130-871-11	FILM	0.01MF	5%	50V	
C33	1-124-589-11	ELECT	47MF	20%	16V	
C34	1-124-589-11	ELECT	47MF	20%	16V	
C35	1-101-004-00	CERAMIC	0.01MF		50V	
C41	1-136-153-00	FILM	0.01MF	5%	50V	
C43	1-136-161-00	FILM	0.047MF	5%	50V	
C44	1-101-004-00	CERAMIC	0.01MF		50V	
C45	1-102-973-00	CERAMIC	100PF	5%	50V	
C46	1-102-973-00	CERAMIC	100PF	5%	50V	
C47	1-101-004-00	CERAMIC	0.01MF		50V	
C48	1-130-471-00	MYLAR	0.001MF	5%	50V	
C49	1-126-301-11	ELECT	1MF	20%	50V	
C50	1-102-973-00	CERAMIC	100PF	5%	50V	
C51	1-130-471-00	MYLAR	0.001MF	5%	50V	
C52	1-124-589-11	ELECT	47MF	20%	16V	
C53	1-102-824-00	CERAMIC	470PF	5%	50V	
C54	1-102-114-00	CERAMIC	470PF	10%	50V	
C55	1-126-301-11	ELECT	1MF	20%	50V	
C56	1-124-261-00	ELECT	10MF	20%	50V	
C57	1-102-973-00	CERAMIC	100PF	5%	50V	
C58	1-102-973-00	CERAMIC	100PF	5%	50V	
C60	1-124-589-11	ELECT	47MF	20%	16V	
C62	1-126-157-11	ELECT	10MF	20%	16V	
C63	1-130-871-11	FILM	0.01MF	5%	50V	
C64	1-101-361-00	CERAMIC	150PF	5%	50V	
C65	1-101-004-00	CERAMIC	0.01MF		50V	
C67	1-136-153-00	FILM	0.01MF	5%	50V	
C68	1-102-973-00	CERAMIC	100PF	5%	50V	
C69	1-102-973-00	CERAMIC	100PF	5%	50V	
C70	1-130-471-00	MYLAR	0.001MF	5%	50V	
C71	1-136-153-00	FILM	0.01MF	5%	50V	
C72	1-102-973-00	CERAMIC	100PF	5%	50V	
C73	1-130-475-00	MYLAR	0.0022MF	5%	50V	
C74	1-136-153-00	FILM	0.01MF	5%	50V	
C75	1-102-978-00	CERAMIC	220PF	5%	50V	
C76	1-101-361-00	CERAMIC	150PF	5%	50V	
C77	1-124-589-11	ELECT	47MF	20%	16V	
C78	1-136-161-00	FILM	0.047MF	5%	50V	

Ref. No.	Part No.	Description				Remark
C79	1-136-165-00	FILM	0.1MF	5%	50V	
C80	1-124-589-11	ELECT	47MF	20%	16V	
C81	1-136-153-00	FILM	0.01MF	5%	50V	
C82	1-136-157-00	FILM	0.022MF	5%	50V	
C83	1-136-165-00	FILM	0.1MF	5%	50V	
C84	1-136-153-00	FILM	0.01MF	5%	50V	
C85	1-136-161-00	FILM	0.047MF	5%	50V	
C86	1-136-157-00	FILM	0.022MF	5%	50V	
C87	1-136-165-00	FILM	0.1MF	5%	50V	
C88	1-124-589-11	ELECT	47MF	20%	16V	
C89	1-136-153-00	FILM	0.01MF	5%	50V	
C90	1-136-161-00	FILM	0.047MF	5%	50V	
C91	1-124-589-11	ELECT	47MF	20%	16V	
C92	1-124-589-11	ELECT	47MF	20%	16V	
C100	1-126-157-11	ELECT	10MF	20%	16V	
C101	1-130-473-00	MYLAR	0.0015MF	5%	50V	
C103	1-124-589-11	ELECT	47MF	20%	16V	
C104	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C105	1-136-161-00	FILM	0.047MF	5%	50V	
C106	1-102-978-00	CERAMIC	220PF	5%	50V	
C107	1-136-161-00	FILM	0.047MF	5%	50V	
C108	1-136-161-00	FILM	0.047MF	5%	50V	
C109	1-102-820-00	CERAMIC	330PF	5%	50V	
C110	1-136-161-00	FILM	0.047MF	5%	50V	
C111	1-136-153-00	FILM	0.01MF	5%	50V	
C112	1-102-961-00	CERAMIC	27PF	5%	50V	
C113	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C114	1-136-161-00	FILM	0.047MF	5%	50V	
C115	1-102-978-00	CERAMIC	220PF	5%	50V	
C116	1-136-161-00	FILM	0.047MF	5%	50V	
C117	1-136-161-00	FILM	0.047MF	5%	50V	
C118	1-102-820-00	CERAMIC	330PF	5%	50V	
C119	1-136-161-00	FILM	0.047MF	5%	50V	
C120	1-136-153-00	FILM	0.01MF	5%	50V	
C121	1-102-961-00	CERAMIC	27PF	5%	50V	
C122	1-124-589-11	ELECT	47MF	20%	16V	
C123	1-124-589-11	ELECT	47MF	20%	16V	
C124	1-101-004-00	CERAMIC	0.01MF		50V	
C125	1-101-004-00	CERAMIC	0.01MF		50V	
C134	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C135	1-136-161-00	FILM	0.047MF	5%	50V	
C136	1-102-978-00	CERAMIC	220PF	5%	50V	
C138	1-136-161-00	FILM	0.047MF	5%	50V	
C139	1-136-161-00	FILM	0.047MF	5%	50V	
C140	1-102-824-00	CERAMIC	470PF	5%	50V	
C141	1-136-161-00	FILM	0.047MF	5%	50V	
C142	1-102-973-00	CERAMIC	100PF	5%	50V	
C143	1-136-153-00	FILM	0.01MF	5%	50V	
C145	1-102-961-00	CERAMIC	27PF	5%	50V	
C146	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C147	1-124-589-11	ELECT	47MF	20%	16V	
C148	1-102-978-00	CERAMIC	220PF	5%	50V	
C149	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C150	1-124-589-11	ELECT	47MF	20%	16V	
C151	1-124-589-11	ELECT	47MF	20%	16V	
C152	1-124-589-11	ELECT	47MF	20%	16V	
C153	1-136-161-00	FILM	0.047MF	5%	50V	
C154	1-136-161-00	FILM	0.047MF	5%	50V	
C155	1-102-824-00	CERAMIC	470PF	5%	50V	
C156	1-136-161-00	FILM	0.047MF	5%	50V	
C157	1-136-153-00	FILM	0.01MF	5%	50V	
C158	1-102-961-00	CERAMIC	27PF	5%	50V	
C159	1-126-157-11	ELECT	10MF	20%	16V	
C160	1-126-157-11	ELECT	10MF	20%	16V	
C161	1-136-161-00	FILM	0.047MF	5%	50V	
C165	1-136-165-00	FILM	0.1MF	5%	50V	
C167	1-124-589-11	ELECT	47MF	20%	16V	
C180	1-124-589-11	ELECT	47MF	20%	16V	
C181	1-124-589-11	ELECT	47MF	20%	16V	
C201	1-102-824-00	CERAMIC	470PF	5%	50V	
C202	1-101-001-00	CERAMIC	0.001MF		50V	
C203	1-101-001-00	CERAMIC	0.001MF		50V	
C204	1-101-001-00	CERAMIC	0.001MF		50V	
C205	1-101-001-00	CERAMIC	0.001MF		50V	
C206	1-101-001-00	CERAMIC	0.001MF		50V	
C207	1-102-978-00	CERAMIC	220PF	5%	50V	
C210	1-101-001-00	CERAMIC	0.001MF		50V	
C211	1-101-001-00	CERAMIC	0.001MF		50V	
C212	1-136-153-00	FILM	0.01MF	5%	50V	
C213	1-162-318-11	CERAMIC	0.001MF	10%	500V	
C214	1-162-318-11	CERAMIC	0.001MF	10%	500V	
C215	1-136-157-00	FILM	0.022MF	5%	50V	
C216	1-136-153-00	FILM	0.01MF	5%	50V	
C217	1-102-973-00	CERAMIC	100PF	5%	50V	
C218	1-130-871-11	FILM	0.01MF	5%	50V	
C220	1-124-589-11	ELECT	47MF	20%	16V	
C222	1-102-973-00	CERAMIC	100PF	5%	50V	
C223	1-136-153-00	FILM	0.01MF	5%	50V	
C224	1-136-153-00	FILM	0.01MF	5%	50V	
C225	1-101-004-00	CERAMIC	0.01MF		50V	
C226	1-102-973-00	CERAMIC	100PF	5%	50V	
C227	1-101-004-00	CERAMIC	0.01MF		50V	
C230	1-101-004-00	CERAMIC	0.01MF		50V	
C231	1-101-004-00	CERAMIC	0.01MF		50V	
C232	1-101-004-00	CERAMIC	0.01MF		50V	
C233	1-102-978-00	CERAMIC	220PF	5%	50V	
C235	1-101-004-00	CERAMIC	0.01MF		50V	
C236	1-101-004-00	CERAMIC	0.01MF		50V	
C237	1-101-004-00	CERAMIC	0.01MF		50V	
C238	1-101-004-00	CERAMIC	0.01MF		50V	
C239	1-101-004-00	CERAMIC	0.01MF		50V	
C240	1-101-004-00	CERAMIC	0.01MF		50V	
C241	1-101-004-00	CERAMIC	0.01MF		50V	

<CONNECTOR>

D2	*1-566-054-11	PIN, CONNECTOR 2P	
D3	*1-566-056-11	PIN, CONNECTOR 4P	
D4	*1-566-062-11	PIN, CONNECTOR 10P	
D5	*1-566-056-11	PIN, CONNECTOR 4P	
D6	*1-566-055-11	PIN, CONNECTOR 3P	
D7	*1-566-054-11	PIN, CONNECTOR 2P	
D9	*1-566-055-11	PIN, CONNECTOR 3P	
D11	*1-566-058-11	PIN, CONNECTOR 6P	
D12	*1-566-054-11	PIN, CONNECTOR 2P	
D13	*1-566-058-11	PIN, CONNECTOR 6P	
D15	*1-566-056-11	PIN, CONNECTOR 4P	
D16	*1-566-055-11	PIN, CONNECTOR 3P	
D17	*1-566-056-11	PIN, CONNECTOR 4P	
D18	*1-566-056-11	PIN, CONNECTOR 4P	

<DIODE>

D

Ref. No.	Part No.	Description	Remark
D1	8-719-110-41	DIODE RD15ESB2	
D2	8-719-110-41	DIODE RD15ESB2	
D3	8-719-110-03	DIODE RD7.5ESB2	
D4	8-719-110-03	DIODE RD7.5ESB2	
D5	8-719-110-03	DIODE RD7.5ESB2	
D6	8-719-911-19	DIODE 1SS119	
D7	8-719-911-19	DIODE 1SS119	
D8	8-719-110-03	DIODE RD7.5ESB2	
D9	8-719-110-03	DIODE RD7.5ESB2	
D13	8-719-911-19	DIODE 1SS119	
D14	8-719-911-19	DIODE 1SS119	
D15	8-719-911-19	DIODE 1SS119	
D16	8-719-110-03	DIODE RD7.5ESB2	
D17	8-719-911-19	DIODE 1SS119	
D18	8-719-911-19	DIODE 1SS119	
D19	8-719-109-81	DIODE RD4.7ESB2	
D20	8-719-110-03	DIODE RD7.5ESB2	
D21	8-719-110-03	DIODE RD7.5ESB2	
D22	8-719-911-19	DIODE 1SS119	
D23	8-719-911-19	DIODE 1SS119	
D24	8-719-911-19	DIODE 1SS119	
D25	8-719-911-19	DIODE 1SS119	
D26	8-719-911-19	DIODE 1SS119	
D27	8-719-911-19	DIODE 1SS119	
D28	8-719-911-19	DIODE 1SS119	
D29	8-719-911-19	DIODE 1SS119	
D30	8-719-911-19	DIODE 1SS119	
D31	8-719-911-19	DIODE 1SS119	
D32	8-719-911-19	DIODE 1SS119	
D33	8-719-911-19	DIODE 1SS119	
D34	8-719-911-19	DIODE 1SS119	
D35	8-719-110-36	DIODE RD13ESB2	
D36	8-719-911-19	DIODE 1SS119	
D37	8-719-110-41	DIODE RD15ESB2	
D39	8-719-911-19	DIODE 1SS119	
D40	8-719-911-19	DIODE 1SS119	
D41	8-719-911-19	DIODE 1SS119	
		<IC>	
IC1	8-759-131-11	IC UPC311	
IC2	8-759-100-60	IC UPC1377	
IC3	8-759-032-85	IC MC74HC138AN	
IC4	8-759-645-19	IC M54519P	
IC5	8-759-208-14	IC TC4066BPHB	
IC6	8-759-040-53	IC MC14053BCP	
IC7	8-759-145-58	IC UPC4558P	
IC8	8-759-145-58	IC UPC4558P	
IC9	8-759-145-58	IC UPC4558P	
IC10	8-759-145-58	IC UPC4558P	
IC11	8-759-145-58	IC UPC4558P	
IC12	8-759-131-11	IC UPC311	
IC13	8-759-131-11	IC UPC311	
IC14	8-759-990-82	IC TL082CP	
IC14	8-759-990-82	IC TL082CP	
IC15	8-759-145-58	IC UPC4558P	
IC16	8-759-014-96	IC MC1496P	
IC17	8-759-232-07	IC TC74HC04AP	
IC18	8-759-981-64	IC LM2903DQ	
IC19	8-759-145-58	IC UPC4558P	
IC20	8-759-145-58	IC UPC4558P	
IC21	8-759-145-58	IC UPC4558P	
IC22	8-759-145-58	IC UPC4558P	
IC23	8-759-040-53	IC MC14053BCP	
IC24	8-759-040-53	IC MC14053BCP	
IC25	8-759-145-58	IC UPC4558P	
IC26	8-759-145-58	IC UPC4558P	
IC27	8-759-145-58	IC UPC4558P	
IC28	8-759-208-06	IC TC4051BPHB	
IC29	8-759-208-06	IC TC4051BPHB	
IC30	8-759-131-11	IC UPC311	
IC31	8-759-131-11	IC UPC311	
IC32	8-759-990-82	IC TL082CP	
		<COIL>	
L1	1-408-239-00	INDUCTOR 4.7MMH	
L3	1-408-237-00	INDUCTOR 3.3MMH	
L4	1-408-237-00	INDUCTOR 3.3MMH	
L5	1-408-237-00	INDUCTOR 3.3MMH	
L6	1-408-237-00	INDUCTOR 3.3MMH	
L7	1-408-240-00	INDUCTOR 6.8MMH	
		<TRANSISTOR>	
Q1	8-729-178-55	TRANSISTOR 2SC2785-E	
Q2	8-729-178-55	TRANSISTOR 2SC2785-E	
Q3	8-729-178-55	TRANSISTOR 2SC2785-E	
Q4	8-729-178-55	TRANSISTOR 2SC2785-E	
Q5	8-729-900-36	TRANSISTOR DTC124ES	
Q6	8-729-178-55	TRANSISTOR 2SC2785-E	
Q7	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q8	8-729-900-36	TRANSISTOR DTC124ES	
Q9	8-729-900-36	TRANSISTOR DTC124ES	
Q10	8-729-201-05	TRANSISTOR 2SC2878-B	
Q11	8-729-201-05	TRANSISTOR 2SC2878-B	
Q12	8-729-201-05	TRANSISTOR 2SC2878-B	
Q13	8-729-201-05	TRANSISTOR 2SC2878-B	
Q14	8-729-201-05	TRANSISTOR 2SC2878-B	
Q16	8-729-900-36	TRANSISTOR DTC124ES	
Q18	8-729-201-05	TRANSISTOR 2SC2878-B	
Q19	8-729-178-55	TRANSISTOR 2SC2785-E	
Q20	8-729-178-55	TRANSISTOR 2SC2785-E	
Q21	8-729-178-55	TRANSISTOR 2SC2785-E	
Q22	8-729-201-05	TRANSISTOR 2SC2878-B	
Q23	8-729-201-05	TRANSISTOR 2SC2878-B	
Q24	8-729-201-05	TRANSISTOR 2SC2878-B	
Q25	8-729-178-55	TRANSISTOR 2SC2785-E	
Q26	8-729-178-55	TRANSISTOR 2SC2785-E	
Q27	8-729-178-55	TRANSISTOR 2SC2785-E	
Q28	8-729-178-55	TRANSISTOR 2SC2785-E	
Q29	8-729-178-55	TRANSISTOR 2SC2785-E	
Q30	8-729-178-55	TRANSISTOR 2SC2785-E	
Q31	8-729-178-55	TRANSISTOR 2SC2785-E	
Q32	8-729-178-55	TRANSISTOR 2SC2785-E	
Q33	8-729-178-55	TRANSISTOR 2SC2785-E	
Q34	8-729-178-55	TRANSISTOR 2SC2785-E	
Q35	8-729-900-36	TRANSISTOR DTC124ES	
Q36	8-729-178-55	TRANSISTOR 2SC2785-E	
Q37	8-729-178-55	TRANSISTOR 2SC2785-E	
Q38	8-729-105-72	TRANSISTOR 2SK523-L1	
Q39	8-729-900-36	TRANSISTOR DTC124ES	
Q40	8-729-178-55	TRANSISTOR 2SC2785-E	
Q41	8-729-105-72	TRANSISTOR 2SK523-L1	

Ref. No.	Part No.	Description	Remark
Q42	8-729-900-36	TRANSISTOR DTC124ES	
Q43	8-729-178-55	TRANSISTOR 2SC2785-E	
Q44	8-729-201-05	TRANSISTOR 2SC2878-B	
Q45	8-729-201-05	TRANSISTOR 2SC2878-B	
Q49	8-729-201-05	TRANSISTOR 2SC2878-B	
Q50	8-729-201-05	TRANSISTOR 2SC2878-B	
Q51	8-729-201-05	TRANSISTOR 2SC2878-B	
Q52	8-729-178-55	TRANSISTOR 2SC2785-E	
Q53	8-729-178-55	TRANSISTOR 2SC2785-E	
Q54	8-729-105-73	TRANSISTOR 2SK523-L2	
Q55	8-729-201-05	TRANSISTOR 2SC2878-B	
Q56	8-729-178-55	TRANSISTOR 2SC2785-E	
Q57	8-729-178-55	TRANSISTOR 2SC2785-E	
Q58	8-729-105-73	TRANSISTOR 2SK523-L2	
Q59	8-729-178-55	TRANSISTOR 2SC2785-E	
Q60	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q61	8-729-201-05	TRANSISTOR 2SC2878-B	
Q62	8-729-201-05	TRANSISTOR 2SC2878-B	
Q63	8-729-178-55	TRANSISTOR 2SC2785-E	
Q64	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q65	8-729-178-55	TRANSISTOR 2SC2785-E	
Q66	8-729-178-55	TRANSISTOR 2SC2785-E	
Q68	8-729-178-55	TRANSISTOR 2SC2785-E	
Q69	8-729-201-05	TRANSISTOR 2SC2878-B	
Q70	8-729-178-55	TRANSISTOR 2SC2785-E	
Q71	8-729-178-55	TRANSISTOR 2SC2785-E	
Q72	8-729-105-73	TRANSISTOR 2SK523-L2	
Q73	8-729-201-05	TRANSISTOR 2SC2878-B	
Q74	8-729-178-55	TRANSISTOR 2SC2785-E	
Q75	8-729-178-55	TRANSISTOR 2SC2785-E	
Q76	8-729-105-73	TRANSISTOR 2SK523-L2	
Q77	8-729-900-36	TRANSISTOR DTC124ES	
Q78	8-729-900-36	TRANSISTOR DTC124ES	
Q79	8-729-201-05	TRANSISTOR 2SC2878-A	
Q80	8-729-201-05	TRANSISTOR 2SC2878-A	
Q81	8-729-178-55	TRANSISTOR 2SC2785-E	
Q82	8-729-178-55	TRANSISTOR 2SC2785-E	
Q83	8-729-178-55	TRANSISTOR 2SC2785-E	
Q84	8-729-178-55	TRANSISTOR 2SC2785-E	
Q102	8-729-900-36	TRANSISTOR DTC124ES	
Q103	8-729-900-36	TRANSISTOR DTC124ES	
Q105	8-729-900-36	TRANSISTOR DTC124ES	
Q106	8-729-900-63	TRANSISTOR DTA124ES	
Q107	8-729-900-63	TRANSISTOR DTA124ES	
Q108	8-729-900-63	TRANSISTOR DTA124ES	
Q109	8-729-178-55	TRANSISTOR 2SC2785-E	
Q110	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q111	8-729-900-36	TRANSISTOR DTC124ES	
Q112	8-729-900-36	TRANSISTOR DTC124ES	
Q113	8-729-900-36	TRANSISTOR DTC124ES	
Q114	8-729-178-55	TRANSISTOR 2SC2785-E	
Q115	8-729-178-55	TRANSISTOR 2SC2785-E	
Q116	8-729-900-36	TRANSISTOR DTC124ES	
Q117	8-729-178-55	TRANSISTOR 2SC2785-E	
Q118	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q119	8-729-178-55	TRANSISTOR 2SC2785-E	
Q120	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q121	8-729-178-55	TRANSISTOR 2SC2785-E	
Q122	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q123	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q124	8-729-178-55	TRANSISTOR 2SC2785-E	

<RESISTOR>

Ref. No.	Part No.	Description			Remark
R1	1-249-425-11	CARBON	4.7K	5% 1/4W	
R2	1-249-431-11	CARBON	15K	5% 1/4W	
R3	1-249-417-11	CARBON	1K	5% 1/4W	
R4	1-249-425-11	CARBON	4.7K	5% 1/4W	
R5	1-249-431-11	CARBON	15K	5% 1/4W	
R6	1-215-421-00	METAL	1K	1% 1/6W	
R7	1-215-437-00	METAL	4.7K	1% 1/6W	
R8	1-215-437-00	METAL	4.7K	1% 1/6W	
R10	1-249-417-11	CARBON	1K	5% 1/4W	
R12	1-247-895-00	CARBON	470K	5% 1/4W	
R13	1-249-417-11	CARBON	1K	5% 1/4W	
R14	1-215-449-00	METAL	15K	1% 1/6W	
R15	1-249-429-11	CARBON	10K	5% 1/4W	
R16	1-249-417-11	CARBON	1K	5% 1/4W	
R17	1-249-426-11	CARBON	5.6K	5% 1/4W	
R18	1-249-417-11	CARBON	1K	5% 1/4W	
R19	1-249-429-11	CARBON	10K	5% 1/4W	
R20	1-249-430-11	CARBON	12K	5% 1/4W	
R21	1-249-430-11	CARBON	12K	5% 1/4W	
R22	1-249-440-11	CARBON	82K	5% 1/4W	
R23	1-249-433-11	CARBON	22K	5% 1/4W	
R24	1-249-440-11	CARBON	82K	5% 1/4W	
R25	1-249-423-11	CARBON	3.3K	5% 1/4W	
R26	1-249-429-11	CARBON	10K	5% 1/4W	
R27	1-247-868-11	CARBON	36K	5% 1/4W	
R28	1-249-428-11	CARBON	8.2K	5% 1/4W	
R29	1-249-437-11	CARBON	47K	5% 1/4W	
R30	1-249-429-11	CARBON	10K	5% 1/4W	
R31	1-249-429-11	CARBON	10K	5% 1/4W	
R32	1-249-417-11	CARBON	1K	5% 1/4W	
R33	1-249-429-11	CARBON	10K	5% 1/4W	
R34	1-249-433-11	CARBON	22K	5% 1/4W	
R35	1-249-429-11	CARBON	10K	5% 1/4W	
R36	1-249-429-11	CARBON	10K	5% 1/4W	
R37	1-249-425-11	CARBON	4.7K	5% 1/4W	
R38	1-249-417-11	CARBON	1K	5% 1/4W	
R39	1-249-417-11	CARBON	1K	5% 1/4W	
R40	1-249-417-11	CARBON	1K	5% 1/4W	
R43	1-249-417-11	CARBON	1K	5% 1/4W	
R44	1-249-429-11	CARBON	10K	5% 1/4W	
R45	1-249-417-11	CARBON	1K	5% 1/4W	
R46	1-249-429-11	CARBON	10K	5% 1/4W	
R48	1-215-481-00	METAL	330K	1% 1/6W	
R49	1-215-481-00	METAL	330K	1% 1/6W	
R50	1-249-417-11	CARBON	1K	5% 1/4W	
R51	1-249-429-11	CARBON	10K	5% 1/4W	
R52	1-249-413-11	CARBON	470	5% 1/4W	
R53	1-249-417-11	CARBON	1K	5% 1/4W	
R54	1-215-421-00	METAL	1K	1% 1/6W	
R59	1-249-417-11	CARBON	1K	5% 1/4W	
R60	1-215-447-00	METAL	12K	1% 1/6W	
R61	1-215-445-00	METAL	10K	1% 1/6W	
R62	1-215-445-00	METAL	10K	1% 1/6W	
R63	1-215-461-00	METAL	47K	1% 1/6W	
R64	1-249-435-11	CARBON	33K	5% 1/4W	
R65	1-249-433-11	CARBON	22K	5% 1/4W	
R66	1-249-405-11	CARBON	100	5% 1/4W	
R67	1-215-445-00	METAL	10K	1% 1/6W	
R68	1-249-429-11	CARBON	10K	5% 1/4W	
R69	1-215-445-00	METAL	10K	1% 1/6W	

D

Ref. No.	Part No.	Description				Remark
R70	1-215-459-00	METAL	39K	1%	1/6W	
R71	1-215-459-00	METAL	39K	1%	1/6W	
R72	1-249-429-11	CARBON	10K	5%	1/4W	
R73	1-215-483-00	METAL	390K	1%	1/6W	
R74	1-249-437-11	CARBON	47K	5%	1/4W	
R75	1-249-441-11	CARBON	100K	5%	1/4W	
R77	1-249-433-11	CARBON	22K	5%	1/4W	
R79	1-215-459-00	METAL	39K	1%	1/6W	
R80	1-215-459-00	METAL	39K	1%	1/6W	
R81	1-215-481-00	METAL	330K	1%	1/6W	
R82	1-249-437-11	CARBON	47K	5%	1/4W	
R83	1-247-893-11	CARBON	390K	5%	1/4W	
R84	1-249-429-11	CARBON	10K	5%	1/4W	
R85	1-249-441-11	CARBON	100K	5%	1/4W	
R86	1-249-433-11	CARBON	22K	5%	1/4W	
R88	1-215-445-00	METAL	10K	1%	1/6W	
R89	1-215-469-00	METAL	100K	1%	1/6W	
R90	1-215-445-00	METAL	10K	1%	1/6W	
R92	1-215-445-00	METAL	10K	1%	1/6W	
R93	1-215-459-00	METAL	39K	1%	1/6W	
R94	1-215-431-00	METAL	2.7K	1%	1/6W	
R96	1-249-429-11	CARBON	10K	5%	1/4W	
R97	1-249-433-11	CARBON	22K	5%	1/4W	
R98	1-215-445-00	METAL	10K	1%	1/6W	
R99	1-215-449-00	METAL	15K	1%	1/6W	
R047	1-215-453-00	METAL	22K	1%	1/6W	
R100	1-215-445-00	METAL	10K	1%	1/6W	
R101	1-215-449-00	METAL	15K	1%	1/6W	
R102	1-215-445-00	METAL	10K	1%	1/6W	
R103	1-249-437-11	CARBON	47K	5%	1/4W	
R104	1-215-445-00	METAL	10K	1%	1/6W	
R105	1-249-429-11	CARBON	10K	5%	1/4W	
R106	1-215-445-00	METAL	10K	1%	1/6W	
R107	1-215-461-00	METAL	47K	1%	1/6W	
R108	1-215-461-00	METAL	47K	1%	1/6W	
R109	1-215-485-00	METAL	470K	1%	1/6W	
R110	1-249-437-11	CARBON	47K	5%	1/4W	
R111	1-249-429-11	CARBON	10K	5%	1/4W	
R112	1-249-441-11	CARBON	100K	5%	1/4W	
R113	1-215-465-00	METAL	68K	1%	1/6W	
R114	1-215-421-00	METAL	1K	1%	1/6W	
R115	1-249-429-11	CARBON	10K	5%	1/4W	
R116	1-215-421-00	METAL	1K	1%	1/6W	
R117	1-215-413-00	METAL	470	1%	1/6W	
R118	1-249-437-11	CARBON	47K	5%	1/4W	
R119	1-249-441-11	CARBON	100K	5%	1/4W	
R120	1-215-449-00	METAL	15K	1%	1/6W	
R121	1-215-449-00	METAL	15K	1%	1/6W	
R122	1-215-449-00	METAL	15K	1%	1/6W	
R123	1-215-449-00	METAL	15K	1%	1/6W	
R127	1-249-405-11	CARBON	100	5%	1/4W	
R130	1-249-420-11	CARBON	1.8K	5%	1/4W	
R131	1-249-425-11	CARBON	4.7K	5%	1/4W	
R132	1-249-425-11	CARBON	4.7K	5%	1/4W	
R133	1-249-417-11	CARBON	1K	5%	1/4W	
R134	1-249-437-11	CARBON	47K	5%	1/4W	
R135	1-249-425-11	CARBON	4.7K	5%	1/4W	
R136	1-249-417-11	CARBON	1K	5%	1/4W	
R137	1-215-421-00	METAL	1K	1%	1/6W	
R138	1-215-452-00	METAL	20K	1%	1/6W	
R139	1-249-417-11	CARBON	1K	5%	1/4W	

Ref. No.	Part No.	Description				Remark
R141	1-247-895-00	CARBON	470K	5%	1/4W	
R142	1-249-421-11	CARBON	2.2K	5%	1/4W	
R143	1-249-435-11	CARBON	33K	5%	1/4W	
R144	1-249-429-11	CARBON	10K	5%	1/4W	
R145	1-249-423-11	CARBON	3.3K	5%	1/4W	
R146	1-215-461-00	METAL	47K	1%	1/6W	
R147	1-249-429-11	CARBON	10K	5%	1/4W	
R148	1-249-433-11	CARBON	22K	5%	1/4W	
R149	1-249-429-11	CARBON	10K	5%	1/4W	
R150	1-249-429-11	CARBON	10K	5%	1/4W	
R151	1-215-441-00	METAL	6.8K	1%	1/6W	
R152	1-249-433-11	CARBON	22K	5%	1/4W	
R153	1-215-457-00	METAL	33K	1%	1/6W	
R154	1-215-453-00	METAL	22K	1%	1/6W	
R155	1-215-453-00	METAL	22K	1%	1/6W	
R156	1-215-469-00	METAL	100K	1%	1/6W	
R157	1-249-429-11	CARBON	10K	5%	1/4W	
R158	1-249-417-11	CARBON	1K	5%	1/4W	
R159	1-249-433-11	CARBON	22K	5%	1/4W	
R160	1-249-437-11	CARBON	47K	5%	1/4W	
R161	1-249-417-11	CARBON	1K	5%	1/4W	
R162	1-215-445-00	METAL	10K	1%	1/6W	
R163	1-249-407-11	CARBON	150	5%	1/4W	
R164	1-249-417-11	CARBON	1K	5%	1/4W	
R165	1-249-401-11	CARBON	47	5%	1/4W	
R166	1-249-430-11	CARBON	12K	5%	1/4W	
R167	1-249-393-11	CARBON	10	5%	1/4W	
R168	1-249-417-11	CARBON	1K	5%	1/4W	
R169	1-249-425-11	CARBON	4.7K	5%	1/4W	
R170	1-249-425-11	CARBON	4.7K	5%	1/4W	
R171	1-249-417-11	CARBON	1K	5%	1/4W	
R172	1-249-417-11	CARBON	1K	5%	1/4W	
R173	1-249-429-11	CARBON	10K	5%	1/4W	
R174	1-249-425-11	CARBON	4.7K	5%	1/4W	
R175	1-249-420-11	CARBON	1.8K	5%	1/4W	
R176	1-249-420-11	CARBON	1.8K	5%	1/4W	
R178	1-249-425-11	CARBON	4.7K	5%	1/4W	
R179	1-249-429-11	CARBON	10K	5%	1/4W	
R180	1-249-429-11	CARBON	10K	5%	1/4W	
R181	1-249-417-11	CARBON	1K	5%	1/4W	
R186	1-249-417-11	CARBON	1K	5%	1/4W	
R187	1-249-425-11	CARBON	4.7K	5%	1/4W	
R190	1-249-423-11	CARBON	3.3K	5%	1/4W	
R191	1-249-429-11	CARBON	10K	5%	1/4W	
R192	1-249-429-11	CARBON	10K	5%	1/4W	
R194	1-249-425-11	CARBON	4.7K	5%	1/4W	
R195	1-249-425-11	CARBON	4.7K	5%	1/4W	
R196	1-249-420-11	CARBON	1.8K	5%	1/4W	
R197	1-249-429-11	CARBON	10K	5%	1/4W	
R198	1-249-420-11	CARBON	1.8K	5%	1/4W	
R199	1-249-420-11	CARBON	1.8K	5%	1/4W	
R200	1-249-429-11	CARBON	10K	5%	1/4W	
R201	1-249-429-11	CARBON	10K	5%	1/4W	
R202	1-249-425-11	CARBON	4.7K	5%	1/4W	
R203	1-249-435-11	CARBON	33K	5%	1/4W	
R204	1-249-441-11	CARBON	100K	5%	1/4W	
R205	1-249-417-11	CARBON	1K	5%	1/4W	
R206	1-249-417-11	CARBON	1K	5%	1/4W	
R207	1-249-437-11	CARBON	47K	5%	1/4W	
R208	1-249-421-11	CARBON	2.2K	5%	1/4W	
R209	1-247-895-00	CARBON	470K	5%	1/4W	
R210	1-249-417-11	CARBON	1K	5%	1/4W	

Ref. No.	Part No.	Description				Remark
R211	1-249-429-11	CARBON	10K	5%	1/4W	
R212	1-249-417-11	CARBON	1K	5%	1/4W	
R213	1-249-429-11	CARBON	10K	5%	1/4W	
R214	1-249-421-11	CARBON	2.2K	5%	1/4W	
R215	1-249-433-11	CARBON	22K	5%	1/4W	
R216	1-249-417-11	CARBON	1K	5%	1/4W	
R217	1-249-417-11	CARBON	1K	5%	1/4W	
R218	1-249-441-11	CARBON	100K	5%	1/4W	
R219	1-247-895-00	CARBON	470K	5%	1/4W	
R220	1-249-429-11	CARBON	10K	5%	1/4W	
R221	1-249-429-11	CARBON	10K	5%	1/4W	
R222	1-249-433-11	CARBON	22K	5%	1/4W	
R223	1-249-437-11	CARBON	47K	5%	1/4W	
R224	1-249-425-11	CARBON	4.7K	5%	1/4W	
R225	1-249-429-11	CARBON	10K	5%	1/4W	
R226	1-215-453-00	METAL	22K	1%	1/6W	
R227	1-215-453-00	METAL	22K	1%	1/6W	
R228	1-215-477-00	METAL	220K	1%	1/6W	
R229	1-249-429-11	CARBON	10K	5%	1/4W	
R230	1-249-441-11	CARBON	100K	5%	1/4W	
R231	1-249-433-11	CARBON	22K	5%	1/4W	
R232	1-249-433-11	CARBON	22K	5%	1/4W	
R233	1-249-429-11	CARBON	10K	5%	1/4W	
R234	1-215-445-00	METAL	10K	1%	1/6W	
R235	1-215-445-00	METAL	10K	1%	1/6W	
R236	1-215-469-00	METAL	100K	1%	1/6W	
R237	1-249-441-11	CARBON	100K	5%	1/4W	
R238	1-249-429-11	CARBON	10K	5%	1/4W	
R239	1-249-433-11	CARBON	22K	5%	1/4W	
R240	1-249-433-11	CARBON	22K	5%	1/4W	
R241	1-215-451-00	METAL	18K	1%	1/6W	
R242	1-247-903-00	CARBON	1M	5%	1/4W	
R243	1-215-451-00	METAL	18K	1%	1/6W	
R244	1-249-429-11	CARBON	10K	5%	1/4W	
R245	1-215-451-00	METAL	18K	1%	1/6W	
R246	1-247-903-00	CARBON	1M	5%	1/4W	
R247	1-215-451-00	METAL	18K	1%	1/6W	
R248	1-249-429-11	CARBON	10K	5%	1/4W	
R249	1-249-433-11	CARBON	22K	5%	1/4W	
R250	1-249-441-11	CARBON	100K	5%	1/4W	
R251	1-249-405-11	CARBON	100	5%	1/4W	
R252	1-249-405-11	CARBON	100	5%	1/4W	
R253	1-249-421-11	CARBON	2.2K	5%	1/4W	
R254	1-215-445-00	METAL	10K	1%	1/6W	
R255	1-249-429-11	CARBON	10K	5%	1/4W	
R256	1-215-445-00	METAL	10K	1%	1/6W	
R257	1-249-429-11	CARBON	10K	5%	1/4W	
R262	1-215-445-00	METAL	10K	1%	1/6W	
R263	1-249-429-11	CARBON	10K	5%	1/4W	
R264	1-215-445-00	METAL	10K	1%	1/6W	
R265	1-249-433-11	CARBON	22K	5%	1/4W	
R266	1-249-441-11	CARBON	100K	5%	1/4W	
R267	1-249-405-11	CARBON	100	5%	1/4W	
R268	1-249-417-11	CARBON	1K	5%	1/4W	
R269	1-215-445-00	METAL	10K	1%	1/6W	
R270	1-249-429-11	CARBON	10K	5%	1/4W	
R271	1-215-445-00	METAL	10K	1%	1/6W	
R272	1-215-469-00	METAL	100K	1%	1/6W	
R273	1-249-429-11	CARBON	10K	5%	1/4W	
R274	1-249-417-11	CARBON	1K	5%	1/4W	
R275	1-249-405-11	CARBON	100	5%	1/4W	
R276	1-249-433-11	CARBON	22K	5%	1/4W	

Ref. No.	Part No.	Description				Remark
R277	1-249-435-11	CARBON	33K	5%	1/4W	
R278	1-249-425-11	CARBON	4.7K	5%	1/4W	
R279	1-249-425-11	CARBON	4.7K	5%	1/4W	
R280	1-249-413-11	CARBON	470	5%	1/4W	
R281	1-249-433-11	CARBON	22K	5%	1/4W	
R282	1-249-421-11	CARBON	2.2K	5%	1/4W	
R283	1-249-417-11	CARBON	1K	5%	1/4W	
R284	1-247-895-00	CARBON	470K	5%	1/4W	
R285	1-247-883-00	CARBON	150K	5%	1/4W	
R286	1-215-469-00	METAL	100K	1%	1/6W	
R287	1-249-429-11	CARBON	10K	5%	1/4W	
R288	1-249-417-11	CARBON	1K	5%	1/4W	
R289	1-249-405-11	CARBON	100	5%	1/4W	
R290	1-249-433-11	CARBON	22K	5%	1/4W	
R291	1-249-435-11	CARBON	33K	5%	1/4W	
R292	1-249-425-11	CARBON	4.7K	5%	1/4W	
R293	1-249-413-11	CARBON	470	5%	1/4W	
R294	1-249-425-11	CARBON	4.7K	5%	1/4W	
R295	1-249-421-11	CARBON	2.2K	5%	1/4W	
R296	1-249-433-11	CARBON	22K	5%	1/4W	
R297	1-247-895-00	CARBON	470K	5%	1/4W	
R298	1-249-417-11	CARBON	1K	5%	1/4W	
R299	1-247-883-00	CARBON	150K	5%	1/4W	
R300	1-215-437-00	METAL	4.7K	1%	1/6W	
R301	1-215-437-00	METAL	4.7K	1%	1/6W	
R302	1-249-421-11	CARBON	2.2K	5%	1/4W	
R303	1-249-423-11	CARBON	3.3K	5%	1/4W	
R309	1-215-453-00	METAL	22K	1%	1/6W	
R310	1-215-453-00	METAL	22K	1%	1/6W	
R311	1-215-461-00	METAL	47K	1%	1/6W	
R312	1-215-453-00	METAL	22K	1%	1/6W	
R313	1-215-453-00	METAL	22K	1%	1/6W	
R314	1-215-453-00	METAL	22K	1%	1/6W	
R315	1-215-453-00	METAL	22K	1%	1/6W	
R316	1-215-453-00	METAL	22K	1%	1/6W	
R317	1-215-453-00	METAL	22K	1%	1/6W	
R318	1-215-453-00	METAL	22K	1%	1/6W	
R319	1-215-453-00	METAL	22K	1%	1/6W	
R320	1-215-461-00	METAL	47K	1%	1/6W	
R321	1-215-453-00	METAL	22K	1%	1/6W	
R322	1-215-453-00	METAL	22K	1%	1/6W	
R323	1-215-457-00	METAL	33K	1%	1/6W	
R324	1-215-461-00	METAL	47K	1%	1/6W	
R325	1-215-461-00	METAL	47K	1%	1/6W	
R326	1-215-461-00	METAL	47K	1%	1/6W	
R327	1-215-457-00	METAL	33K	1%	1/6W	
R328	1-215-457-00	METAL	33K	1%	1/6W	
R329	1-215-477-00	METAL	220K	1%	1/6W	
R330	1-215-469-00	METAL	100K	1%	1/6W	
R331	1-215-477-00	METAL	220K	1%	1/6W	
R332	1-215-457-00	METAL	33K	1%	1/6W	
R333	1-215-421-00	METAL	1K	1%	1/6W	
R334	1-249-433-11	CARBON	22K	5%	1/4W	
R335	1-249-437-11	CARBON	47K	5%	1/4W	
R336	1-215-457-00	METAL	33K	1%	1/6W	
R337	1-215-461-00	METAL	47K	1%	1/6W	
R338	1-215-461-00	METAL	47K	1%	1/6W	
R339	1-215-461-00	METAL	47K	1%	1/6W	
R340	1-215-457-00	METAL	33K	1%	1/6W	
R341	1-215-461-00	METAL	47K	1%	1/6W	
R342	1-215-453-00	METAL	22K	1%	1/6W	

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Ref. No.	Part No.	Description				Remark
R343	1-249-433-11	CARBON	22K	5%	1/4W	
R344	1-215-445-00	METAL	10K	1%	1/6W	
R345	1-215-469-00	METAL	100K	1%	1/6W	
R346	1-249-429-11	CARBON	10K	5%	1/4W	
R347	1-215-445-00	METAL	10K	1%	1/6W	
R350	1-215-437-00	METAL	4.7K	1%	1/6W	
R351	1-249-429-11	CARBON	10K	5%	1/4W	
R352	1-249-405-11	CARBON	100	5%	1/4W	
R353	1-249-433-11	CARBON	22K	5%	1/4W	
R354	1-249-417-11	CARBON	1K	5%	1/4W	
R355	1-249-421-11	CARBON	2.2K	5%	1/4W	
R356	1-249-393-11	CARBON	10	5%	1/4W	F
R357	1-249-393-11	CARBON	10	5%	1/4W	F
R358	1-249-435-11	CARBON	33K	5%	1/4W	
R359	1-249-429-11	CARBON	10K	5%	1/4W	
R360	1-215-397-00	METAL	100	1%	1/6W	
R361	1-249-421-11	CARBON	2.2K	5%	1/4W	
R362	1-249-425-11	CARBON	4.7K	5%	1/4W	
R363	1-249-425-11	CARBON	4.7K	5%	1/4W	
R364	1-249-413-11	CARBON	470	5%	1/4W	
R366	1-249-421-11	CARBON	2.2K	5%	1/4W	
R367	1-249-433-11	CARBON	22K	5%	1/4W	
R369	1-215-479-00	METAL	270K	1%	1/6W	
R370	1-249-417-11	CARBON	1K	5%	1/4W	
R371	1-247-895-00	CARBON	470K	5%	1/4W	
R372	1-215-469-00	METAL	100K	1%	1/6W	
R373	1-202-735-00	SOLID	22M	10%	1/2W	
R374	1-215-477-00	METAL	220K	1%	1/6W	
R375	1-247-883-00	CARBON	150K	5%	1/4W	
R376	1-249-435-11	CARBON	33K	5%	1/4W	
R377	1-215-437-00	METAL	4.7K	1%	1/6W	
R378	1-215-469-00	METAL	100K	1%	1/6W	
R379	1-249-429-11	CARBON	10K	5%	1/4W	
R380	1-215-437-00	METAL	4.7K	1%	1/6W	
R381	1-215-461-00	METAL	47K	1%	1/6W	
R382	1-249-405-11	CARBON	100	5%	1/4W	
R383	1-249-433-11	CARBON	22K	5%	1/4W	
R384	1-249-425-11	CARBON	4.7K	5%	1/4W	
R385	1-249-417-11	CARBON	1K	5%	1/4W	
R386	1-249-433-11	CARBON	22K	5%	1/4W	
R387	1-215-421-00	METAL	1K	1%	1/6W	
R389	1-249-405-11	CARBON	100	5%	1/4W	
R390	1-249-435-11	CARBON	33K	5%	1/4W	
R391	1-249-425-11	CARBON	4.7K	5%	1/4W	
R392	1-249-425-11	CARBON	4.7K	5%	1/4W	
R393	1-249-413-11	CARBON	470	5%	1/4W	
R394	1-249-405-11	CARBON	100	5%	1/4W	
R395	1-249-421-11	CARBON	2.2K	5%	1/4W	
R396	1-249-433-11	CARBON	22K	5%	1/4W	
R397	1-249-417-11	CARBON	1K	5%	1/4W	
R398	1-247-895-00	CARBON	470K	5%	1/4W	
R399	1-249-421-11	CARBON	2.2K	5%	1/4W	
R400	1-247-883-00	CARBON	150K	5%	1/4W	
R401	1-249-437-11	CARBON	47K	5%	1/4W	
R406	1-215-431-00	METAL	2.7K	1%	1/6W	
R407	1-215-453-00	METAL	22K	1%	1/6W	
R410	1-247-903-00	CARBON	1M	5%	1/4W	
R411	1-247-903-00	CARBON	1M	5%	1/4W	
R412	1-215-421-00	METAL	1K	1%	1/6W	
R413	1-215-437-00	METAL	4.7K	1%	1/6W	
R414	1-215-445-00	METAL	10K	1%	1/6W	
R415	1-249-405-11	CARBON	100	5%	1/4W	

Ref. No.	Part No.	Description				Remark
R450	1-249-429-11	CARBON	10K	5%	1/4W	
R452	1-249-423-11	CARBON	3.3K	5%	1/4W	
R453	1-249-401-11	CARBON	47	5%	1/4W	F
R454	1-249-393-11	CARBON	10	5%	1/4W	
R455	1-249-413-11	CARBON	470	5%	1/4W	
R456	1-249-405-11	CARBON	100	5%	1/4W	
R457	1-249-405-11	CARBON	100	5%	1/4W	
R458	1-249-427-11	CARBON	6.8K	5%	1/4W	
R501	1-249-417-11	CARBON	1K	5%	1/4W	
R503	1-249-437-11	CARBON	47K	5%	1/4W	
R504	1-249-441-11	CARBON	100K	5%	1/4W	
R505	1-215-421-00	METAL	1K	1%	1/6W	
R506	1-249-430-11	CARBON	12K	5%	1/4W	
R507	1-249-417-11	CARBON	1K	5%	1/4W	
R508	1-249-429-11	CARBON	10K	5%	1/4W	
R509	1-249-417-11	CARBON	1K	5%	1/4W	
R510	1-249-417-11	CARBON	1K	5%	1/4W	
R511	1-249-429-11	CARBON	10K	5%	1/4W	
R512	1-249-429-11	CARBON	10K	5%	1/4W	
R513	1-249-429-11	CARBON	10K	5%	1/4W	
R514	1-249-433-11	CARBON	22K	5%	1/4W	
R515	1-249-421-11	CARBON	2.2K	5%	1/4W	
R516	1-249-421-11	CARBON	2.2K	5%	1/4W	
R517	1-249-421-11	CARBON	2.2K	5%	1/4W	
R518	1-249-433-11	CARBON	22K	5%	1/4W	
R519	1-249-433-11	CARBON	22K	5%	1/4W	
R520	1-249-429-11	CARBON	10K	5%	1/4W	
R521	1-215-421-00	METAL	1K	1%	1/6W	
R522	1-215-421-00	METAL	1K	1%	1/6W	
R523	1-215-421-00	METAL	1K	1%	1/6W	
R524	1-215-421-00	METAL	1K	1%	1/6W	
R525	1-215-449-00	METAL	15K	1%	1/6W	
R526	1-215-449-00	METAL	15K	1%	1/6W	
R527	1-215-449-00	METAL	15K	1%	1/6W	
R528	1-215-449-00	METAL	15K	1%	1/6W	
R529	1-215-443-00	METAL	8.2K	1%	1/6W	
R530	1-215-449-00	METAL	15K	1%	1/6W	
R531	1-215-449-00	METAL	15K	1%	1/6W	
R532	1-215-443-00	METAL	8.2K	1%	1/6W	
R533	1-215-421-00	METAL	1K	1%	1/6W	
R534	1-215-413-00	METAL	470	1%	1/6W	
R535	1-249-429-11	CARBON	10K	5%	1/4W	
R536	1-249-429-11	CARBON	10K	5%	1/4W	
R537	1-249-429-11	CARBON	10K	5%	1/4W	
R538	1-249-427-11	CARBON	6.8K	5%	1/4W	
R539	1-249-427-11	CARBON	6.8K	5%	1/4W	
R540	1-249-405-11	CARBON	100	5%	1/4W	
R541	1-249-429-11	CARBON	10K	5%	1/4W	
R542	1-215-437-00	METAL	4.7K	1%	1/6W	
R543	1-215-437-00	METAL	4.7K	1%	1/6W	
R546	1-249-425-11	CARBON	4.7K	5%	1/4W	
R547	1-249-429-11	CARBON	10K	5%	1/4W	
R548	1-215-430-00	METAL	2.4K	1%	1/6W	
R550	1-249-405-11	CARBON	100	5%	1/4W	
R551	1-215-430-00	METAL	2.4K	1%	1/6W	
R552	1-215-439-00	METAL	5.6K	1%	1/6W	
R553	1-249-413-11	CARBON	470	5%	1/4W	
R554	1-249-413-11	CARBON	470	5%	1/4W	
R560	1-249-433-11	CARBON	22K	5%	1/4W	
R561	1-249-433-11	CARBON	22K	5%	1/4W	
R562	1-249-429-11	CARBON	10K	5%	1/4W	
R563	1-249-420-11	CARBON	1.8K	5%	1/4W	

Ref. No.	Part No.	Description				Remark
R564	1-249-433-11	CARBON	22K	5%	1/4W	
R565	1-249-429-11	CARBON	10K	5%	1/4W	
R566	1-249-437-11	CARBON	47K	5%	1/4W	
R567	1-215-451-00	METAL	18K	1%	1/6W	
R568	1-215-453-00	METAL	22K	1%	1/6W	
R569	1-247-895-00	CARBON	470K	5%	1/4W	
R570	1-249-421-11	CARBON	2.2K	5%	1/4W	
R571	1-249-425-11	CARBON	4.7K	5%	1/4W	
R572	1-249-431-11	CARBON	15K	5%	1/4W	
R573	1-249-441-11	CARBON	100K	5%	1/4W	
R574	1-249-417-11	CARBON	1K	5%	1/4W	
R575	1-249-425-11	CARBON	4.7K	5%	1/4W	
R576	1-215-453-00	METAL	22K	1%	1/6W	
R577	1-215-445-00	METAL	10K	1%	1/6W	
R578	1-249-429-11	CARBON	10K	5%	1/4W	
R579	1-249-393-11	CARBON	10	5%	1/4W	F
R580	1-249-393-11	CARBON	10	5%	1/4W	F
R581	1-249-389-11	CARBON	4.7	5%	1/4W	F
R582	1-249-425-11	CARBON	4.7K	5%	1/4W	
R583	1-249-429-11	CARBON	10K	5%	1/4W	
R585	1-215-461-00	METAL	47K	1%	1/6W	
R586	1-249-427-11	CARBON	6.8K	5%	1/4W	
R587	1-249-433-11	CARBON	22K	5%	1/4W	
R588	1-215-453-00	METAL	22K	1%	1/6W	
R589	1-249-429-11	CARBON	10K	5%	1/4W	
R590	1-249-429-11	CARBON	10K	5%	1/4W	
R591	1-249-429-11	CARBON	10K	5%	1/4W	
R592	1-215-397-00	METAL	100	1%	1/6W	
R595	1-249-421-11	CARBON	2.2K	5%	1/4W	

<VARIABLE RESISTOR>

RV1	1-237-517-21	RES, ADJ, CERMET	5K
RV2	1-237-517-21	RES, ADJ, CERMET	5K
RV3	1-237-518-21	RES, ADJ, CERMET	10K
RV4	1-237-517-21	RES, ADJ, CERMET	5K
RV5	1-237-517-21	RES, ADJ, CERMET	5K
RV6	1-237-517-21	RES, ADJ, CERMET	5K
RV7	1-237-519-21	RES, ADJ, CERMET	20K
RV8	1-237-519-21	RES, ADJ, CERMET	20K
RV9	1-237-517-21	RES, ADJ, CERMET	5K
RV10	1-237-518-21	RES, ADJ, CERMET	10K
RV11	1-237-518-21	RES, ADJ, CERMET	10K
RV12	1-237-519-21	RES, ADJ, CERMET	20K
RV13	1-237-518-21	RES, ADJ, CERMET	10K
RV14	1-237-518-21	RES, ADJ, CERMET	10K
RV15	1-237-519-21	RES, ADJ, CERMET	20K
RV16	1-237-519-21	RES, ADJ, CERMET	20K
RV17	1-237-519-21	RES, ADJ, CERMET	20K
RV18	1-237-519-21	RES, ADJ, CERMET	20K
RV19	1-237-519-21	RES, ADJ, CERMET	20K
RV22	1-237-518-21	RES, ADJ, CERMET	10K
RV23	1-237-518-21	RES, ADJ, CERMET	10K
RV24	1-237-518-21	RES, ADJ, CERMET	10K
RV25	1-237-518-21	RES, ADJ, CERMET	10K
RV26	1-237-518-21	RES, ADJ, CERMET	10K
RV27	1-237-518-21	RES, ADJ, CERMET	10K
RV28	1-237-518-21	RES, ADJ, CERMET	10K
RV29	1-237-518-21	RES, ADJ, CERMET	10K
RV30	1-237-518-21	RES, ADJ, CERMET	10K
RV31	1-237-518-21	RES, ADJ, CERMET	10K
RV32	1-237-518-21	RES, ADJ, CERMET	10K
RV33	1-237-518-21	RES, ADJ, CERMET	10K
RV34	1-237-518-21	RES, ADJ, CERMET	10K
RV35	1-237-518-21	RES, ADJ, CERMET	10K
RV36	1-237-518-21	RES, ADJ, CERMET	10K
RV37	1-237-518-21	RES, ADJ, CERMET	10K
RV38	1-237-518-21	RES, ADJ, CERMET	10K
RV39	1-237-518-21	RES, ADJ, CERMET	10K
RV40	1-237-518-21	RES, ADJ, CERMET	10K
RV41	1-237-518-21	RES, ADJ, CERMET	10K
RV42	1-237-518-21	RES, ADJ, CERMET	10K
RV43	1-237-518-21	RES, ADJ, CERMET	10K
RV44	1-237-518-21	RES, ADJ, CERMET	10K
RV45	1-237-518-21	RES, ADJ, CERMET	10K
RV46	1-237-518-21	RES, ADJ, CERMET	10K
RV47	1-237-518-21	RES, ADJ, CERMET	10K
RV48	1-237-518-21	RES, ADJ, CERMET	10K
RV49	1-237-518-21	RES, ADJ, CERMET	10K
RV50	1-237-518-21	RES, ADJ, CERMET	10K
RV51	1-237-518-21	RES, ADJ, CERMET	10K
RV52	1-237-521-21	RES, ADJ, CERMET	100K
RV53	1-237-518-21	RES, ADJ, CERMET	10K
RV54	1-237-520-21	RES, ADJ, CERMET	50K
RV55	1-237-520-21	RES, ADJ, CERMET	50K
RV56	1-237-518-21	RES, ADJ, CERMET	10K
RV57	1-237-518-21	RES, ADJ, CERMET	10K
RV58	1-237-519-21	RES, ADJ, CERMET	20K
RV59	1-237-520-21	RES, ADJ, CERMET	50K
RV60	1-237-519-21	RES, ADJ, CERMET	20K
RV61	1-237-519-21	RES, ADJ, CERMET	20K
RV62	1-237-518-21	RES, ADJ, CERMET	10K
RV63	1-237-518-21	RES, ADJ, CERMET	10K
RV64	1-237-518-21	RES, ADJ, CERMET	10K
RV65	1-237-518-21	RES, ADJ, CERMET	10K
RV66	1-237-519-21	RES, ADJ, CERMET	20K
RV67	1-237-519-21	RES, ADJ, CERMET	20K
RV68	1-237-519-21	RES, ADJ, CERMET	20K
RV69	1-237-519-21	RES, ADJ, CERMET	20K
RV70	1-224-250-99	RES, ADJ, METAL GLAZE	2.2K
RV71	1-237-518-21	RES, ADJ, CERMET	10K
RV72	1-237-517-21	RES, ADJ, CERMET	5K
RV73	1-237-517-21	RES, ADJ, CERMET	5K
RV74	1-237-517-21	RES, ADJ, CERMET	5K
RV75	1-237-516-21	RES, ADJ, CERMET	2K
RV76	1-237-512-21	RES, ADJ, CERMET	100
RV77	1-237-517-21	RES, ADJ, CERMET	5K
RV78	1-237-518-21	RES, ADJ, CERMET	10K

W YA JA

Ref. No.	Part No.	Description			Remark
**********					
	*1-619-842-11	W BOARD			
		*******			
		<CAPACITOR>			
C1	1-124-589-11	ELECT	47MF	20% 16V	
C2	1-124-589-11	ELECT	47MF	20% 16V	
C3	1-136-165-00	FILM	0.1MF	5% 50V	
		<IC>			
IC1	8-759-208-14	IC TC4066BPHB			
IC2	8-759-208-14	IC TC4066BPHB			
		<RESISTOR>			
R1	1-215-459-00	METAL	39K	1% 1/6W	
R2	1-215-459-00	METAL	39K	1% 1/6W	
R3	1-215-459-00	METAL	39K	1% 1/6W	
R4	1-215-459-00	METAL	39K	1% 1/6W	
R5	1-215-459-00	METAL	39K	1% 1/6W	
R6	1-215-459-00	METAL	39K	1% 1/6W	
R7	1-215-453-00	METAL	22K	1% 1/6W	
R8	1-215-453-00	METAL	22K	1% 1/6W	
R9	1-215-453-00	METAL	22K	1% 1/6W	
R10	1-215-453-00	METAL	22K	1% 1/6W	
R11	1-215-453-00	METAL	22K	1% 1/6W	
R12	1-215-453-00	METAL	22K	1% 1/6W	
		<VARIABLE RESISTOR>			
RV1	1-237-518-21	RES, ADJ, CERMET 10K			
RV2	1-237-518-21	RES, ADJ, CERMET 10K			
RV3	1-237-518-21	RES, ADJ, CERMET 10K			
RV4	1-237-518-21	RES, ADJ, CERMET 10K			
RV5	1-237-518-21	RES, ADJ, CERMET 10K			
RV6	1-237-518-21	RES, ADJ, CERMET 10K			
RV7	1-237-518-21	RES, ADJ, CERMET 10K			
RV8	1-237-518-21	RES, ADJ, CERMET 10K			
RV9	1-237-518-21	RES, ADJ, CERMET 10K			
RV10	1-237-518-21	RES, ADJ, CERMET 10K			
RV11	1-237-518-21	RES, ADJ, CERMET 10K			
RV12	1-237-518-21	RES, ADJ, CERMET 10K			
		<SWITCH>			
SW1	1-553-634-00	SWITCH, ROTARY			
SW2	1-570-509-11	SWITCH, TOGGLE			
SW3	1-570-509-11	SWITCH, TOGGLE			
		<CONNECTOR>			
W1	*1-566-060-11	PIN, CONNECTOR 8P			
W2	*1-566-058-11	PIN, CONNECTOR 6P			

Ref. No.	Part No.	Description			Remark
**********					
	*1-629-771-11	YA BOARD			
		********			
	*4-360-299-01	HOLDER, LED			
		<DIODE>			
D1	8-719-812-43	DIODE TLG124A			
**********					
	*1-626-506-11	JA BOARD			
		********			
	*4-378-902-01	HOLDER, LED			
		<CAPACITOR>			
C101	1-126-157-11	ELECT	10MF	20% 16V	
C102	1-126-157-11	ELECT	10MF	20% 16V	
C103	1-126-157-11	ELECT	10MF	20% 16V	
C104	1-101-004-00	CERAMIC	0.01MF	50V	
C105	1-101-004-00	CERAMIC	0.01MF	50V	
C106	1-101-004-00	CERAMIC	0.01MF	50V	
C107	1-101-004-00	CERAMIC	0.01MF	50V	
C108	1-101-004-00	CERAMIC	0.01MF	50V	
C109	1-101-004-00	CERAMIC	0.01MF	50V	
		<DIODE>			
D101	8-719-938-68	DIODE GL-3HY8			
D102	8-719-938-68	DIODE GL-3HY8			
D103	8-719-938-68	DIODE GL-3HY8			
D104	8-719-938-68	DIODE GL-3HY8			
D105	8-719-911-19	DIODE 1SS119			
D106	8-719-911-19	DIODE 1SS119			
D108	8-719-911-19	DIODE 1SS119			
D109	8-719-911-19	DIODE 1SS119			
		<IC>			
IC1	8-759-040-53	IC MC14053BCP			
IC2	8-759-040-53	IC MC14053BCP			
IC3	8-759-645-19	IC M54519P			
		<CONNECTOR>			
JA1	*1-566-058-11	PIN, CONNECTOR 6P			
JA2	*1-566-056-11	PIN, CONNECTOR 4P			
JA3	*1-566-056-11	PIN, CONNECTOR 4P			
		<TRANSISTOR>			
Q101	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q102	8-729-900-36	TRANSISTOR DTC124ES			
Q103	8-729-900-36	TRANSISTOR DTC124ES			
		<RESISTOR>			
R103	1-249-428-11	CARBON	8.2K	5% 1/4W	
R104	1-249-428-11	CARBON	8.2K	5% 1/4W	
R105	1-215-425-00	METAL	1.5K	1% 1/6W	
R106	1-215-445-00	METAL	10K	1% 1/6W	

The components identified by shading and mark ⚠ are critical for safety.
Replace only with part number specified.

Les composants identifies par une trame et une marque ⚠ sont critiques pour la securite.
Ne les remplacer que par une piece portant le numero specifie.

Ref. No.	Part No.	Description				Remark
R108	1-249-405-11	CARBON	100	5%	1/4W	
R109	1-249-405-11	CARBON	100	5%	1/4W	
R110	1-249-405-11	CARBON	100	5%	1/4W	
R111	1-249-405-11	CARBON	100	5%	1/4W	
R112	1-249-429-11	CARBON	10K	5%	1/4W	
R113	1-249-405-11	CARBON	100	5%	1/4W	
R114	1-249-405-11	CARBON	100	5%	1/4W	
R115	1-249-405-11	CARBON	100	5%	1/4W	
R116	1-249-429-11	CARBON	10K	5%	1/4W	
R117	1-249-405-11	CARBON	100	5%	1/4W	
R118	1-249-429-11	CARBON	10K	5%	1/4W	
R119	1-249-405-11	CARBON	100	5%	1/4W	
R120	1-249-405-11	CARBON	100	5%	1/4W	
R121	1-249-428-11	CARBON	8.2K	5%	1/4W	
R122	1-249-428-11	CARBON	8.2K	5%	1/4W	
R123	1-249-405-11	CARBON	100	5%	1/4W	
R124	1-249-417-11	CARBON	1K	5%	1/4W	
R125	1-249-429-11	CARBON	10K	5%	1/4W	
R126	1-249-429-11	CARBON	10K	5%	1/4W	
R127	1-249-405-11	CARBON	100	5%	1/4W	
R128	1-249-405-11	CARBON	100	5%	1/4W	
R129	1-249-405-11	CARBON	100	5%	1/4W	
R130	1-249-429-11	CARBON	10K	5%	1/4W	
		<VARIABLE RESISTOR>				
RV101	1-237-519-21	RES, ADJ, CERMET 20K				
RV102	1-237-121-11	RES, VAR (CP ELEMENT) 20K				
RV103	1-237-519-21	RES, ADJ, CERMET 20K				
RV104	1-237-121-11	RES, VAR (CP ELEMENT) 20K				
		<SWITCH>				
S101	1-570-509-11	SWITCH, TOGGLE				
S102	1-570-509-11	SWITCH, TOGGLE				
S103	1-554-472-00	SWITCH, PUSH (1 KEY)				
S104	1-554-472-00	SWITCH, PUSH (1 KEY)				
S105	1-554-472-00	SWITCH, PUSH (1 KEY)				
S106	1-554-472-00	SWITCH, PUSH (1 KEY)				
S107	1-554-472-00	SWITCH, PUSH (1 KEY)				
S108	1-570-509-11	SWITCH, TOGGLE				
S109	1-570-509-11	SWITCH, TOGGLE				
S110	1-570-510-11	SWITCH, TOGGLE				
S111	*1-561-724-00	SOCKET, CONNECTOR 2P				
S111	*1-564-431-11	POST, CONNECTOR 3P				
S112	*1-561-724-00	SOCKET, CONNECTOR 2P				
S112	*1-564-431-11	POST, CONNECTOR 3P				
S113	1-570-510-11	SWITCH, TOGGLE				

Ref. No.	Part No.	Description				Remark
	*1-627-688-11	JB BOARD ********				
		<CONNECTOR>				
JB1	*1-566-054-11	PIN, CONNECTOR 2P				
JB2	*1-566-054-11	PIN, CONNECTOR 2P				
JB3	*1-566-054-11	PIN, CONNECTOR 2P				
JB4	*1-566-057-11	PIN, CONNECTOR 5P				
JB5	*1-566-054-11	PIN, CONNECTOR 2P				
		<SWITCH>				
S1	1-570-372-11	SWITCH, PUSH (1 KEY)				
S2	1-554-472-00	SWITCH, PUSH (1 KEY)				
S3	1-554-472-00	SWITCH, PUSH (1 KEY)				
S4	1-554-472-00	SWITCH, PUSH (1 KEY)				
S5	1-570-509-11	SWITCH, TOGGLE				
	*A-1389-709-A	XA BOARD, COMPLETE **********				
	*1-563-164-11	CONNECTOR, MULTI L-J 64P				
	4-378-915-01	NUT (M2.6), PLATE				
		<CONNECTOR>				
XA1	*1-562-729-11	CONNECTOR, MULTI 64P				
	*1-610-380-12	K BOARD *******				
		<CAPACITOR>				
C1	⚠1-162-169-12	CAP BLOCK, HIGH-VOLTAGE				
C2	1-136-106-00	FILM	0.36MF	5%	200V	
		<CONNECTOR>				
K1	*1-508-768-00	PIN, CONNECTOR (5MM PITCH) 6P				
K2	*1-508-766-00	PIN, CONNECTOR (5MM PITCH) 4P				
K3	*1-566-055-11	PIN, CONNECTOR 3P				
K4	*1-566-059-11	PIN, CONNECTOR 7P				
K5	*1-566-058-11	PIN, CONNECTOR 6P				
K6	*1-508-765-00	PIN, CONNECTOR (5MM PITCH) 3P				
K8	*1-508-784-00	PIN, CONNECTOR (5MM PITCH) 1P				
		<RESISTOR>				
R1	1-202-818-00	SOLID	1K	10%	1/2W	
	*1-626-502-11	ZN BOARD ********				
		<CONNECTOR>				
ZN1	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR 64P				

ZN L ZE

Ref. No.	Part No.	Description	Remark
	4-378-915-01	NUT (M2.6), PLATE; ZN1	
ZN2	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR 64P	
	4-378-915-01	NUT (M2.6), PLATE; ZN2	
ZN3	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR 64P	
	4-378-915-01	NUT (M2.6), PLATE; ZN3	
ZN4	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR 64P	
	4-378-915-01	NUT (M2.6), PLATE; ZN4	
ZN5	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR 64P	
	4-378-915-01	NUT (M2.6), PLATE; ZN5	
ZN6	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR 64P	
	4-378-915-01	NUT (M2.6), PLATE; ZN6	
ZN7	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR 64P	
	4-378-915-01	NUT (M2.6), PLATE; ZN7	
ZN8	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR 64P	
	4-378-915-01	NUT (M2.6), PLATE; ZN8	
ZN9	*1-566-060-11	PIN, CONNECTOR 8P	
ZN10	*1-566-060-11	PIN, CONNECTOR 8P	
ZN11	*1-566-060-11	PIN, CONNECTOR 8P	
ZN12	*1-566-058-11	PIN, CONNECTOR 6P	
ZN14	*1-566-062-11	PIN, CONNECTOR 10P	
ZN15	*1-566-057-11	PIN, CONNECTOR 5P	
ZN16	*1-566-057-11	PIN, CONNECTOR 5P	
ZN17	*1-566-057-11	PIN, CONNECTOR 5P	
ZN19	*1-566-054-11	PIN, CONNECTOR 2P	
ZN21	*1-566-059-11	PIN, CONNECTOR 7P	
ZN22	*1-566-058-11	PIN, CONNECTOR 6P	
ZN23	*1-566-058-11	PIN, CONNECTOR 6P	
ZN25	*1-566-058-11	PIN, CONNECTOR 6P	
ZN26	*1-566-058-11	PIN, CONNECTOR 6P	
ZN27	*1-566-058-11	PIN, CONNECTOR 6P	
ZN30	*1-562-768-11	RECEPTACLE, MULTI CONNECTOR 64P	
	4-378-915-01	NUT (M2.6), PLATE; ZN30	
**********			
	*1-629-774-11	L BOARD	
		*******	
		<DIODE>	
D1	8-719-920-21	DIODE LT-9220H	
		<RESISTOR>	
R1	1-249-408-11	CARBON 180 5% 1/4W	
**********			
	*A-1394-098-A	ZE BOARD, COMPLETE	
		******************	
	3-618-225-00	NUT, PLATE	
	*4-353-708-00	HOOK, FINGER	
	4-378-915-01	NUT (M2.6), PLATE (N1, N2)	
		<CAPACITOR>	
C1	1-101-361-00	CERAMIC 150PF 10% 50V	
C2	1-101-361-00	CERAMIC 150PF 10% 50V	
C3	1-124-120-11	ELECT 220MF 20% 16V	
C4	1-101-004-00	CERAMIC 0.01MF 50V	
C5	1-101-004-00	CERAMIC 0.01MF 50V	
C6	1-101-004-00	CERAMIC 0.01MF 50V	
C7	1-101-004-00	CERAMIC 0.01MF 50V	

Ref. No.	Part No.	Description	Remark
C8	1-101-004-00	CERAMIC 0.01MF 50V	
C9	1-101-004-00	CERAMIC 0.01MF 50V	
C10	1-101-004-00	CERAMIC 0.01MF 50V	
C11	1-124-120-11	ELECT 220MF 20% 16V	
C12	1-124-120-11	ELECT 220MF 20% 16V	
C13	1-126-101-11	ELECT 100MF 20% 16V	
C14	1-126-101-11	ELECT 100MF 20% 16V	
C15	1-101-004-00	CERAMIC 0.01MF 50V	
C16	1-101-004-00	CERAMIC 0.01MF 50V	
C17	1-124-477-11	ELECT 47MF 20% 16V	
C18	1-124-477-11	ELECT 47MF 20% 16V	
C19	1-101-888-00	CERAMIC 68PF 10% 50V	
C20	1-101-004-00	CERAMIC 0.01MF 50V	
C21	1-101-004-00	CERAMIC 0.01MF 50V	
C22	1-101-004-00	CERAMIC 0.01MF 50V	
C101	1-101-888-00	CERAMIC 68PF 10% 50V	
C102	1-102-934-00	CERAMIC 1PF 0.5PF 50V	
C103	1-101-888-00	CERAMIC 68PF 10% 50V	
C104	1-102-934-00	CERAMIC 1PF 0.5PF 50V	
C105	1-102-978-00	CERAMIC 220PF 10% 50V	
C106	1-102-978-00	CERAMIC 220PF 10% 50V	
C107	1-102-963-00	CERAMIC 33PF 10% 50V	
C108	1-101-004-00	CERAMIC 0.01MF 50V	
C109	1-101-004-00	CERAMIC 0.01MF 50V	
C110	1-101-004-00	CERAMIC 0.01MF 50V	
C111	1-101-004-00	CERAMIC 0.01MF 50V	
C112	1-101-004-00	CERAMIC 0.01MF 50V	
C113	1-101-004-00	CERAMIC 0.01MF 50V	
C114	1-101-004-00	CERAMIC 0.01MF 50V	
C115	1-101-004-00	CERAMIC 0.01MF 50V	
C116	1-101-004-00	CERAMIC 0.01MF 50V	
C117	1-101-004-00	CERAMIC 0.01MF 50V	
C201	1-101-888-00	CERAMIC 68PF 10% 50V	
C202	1-102-934-00	CERAMIC 1PF 0.5PF 50V	
C203	1-101-888-00	CERAMIC 68PF 10% 50V	
C204	1-102-934-00	CERAMIC 1PF 0.5PF 50V	
C205	1-102-978-00	CERAMIC 220PF 10% 50V	
C206	1-102-978-00	CERAMIC 220PF 10% 50V	
C207	1-102-963-00	CERAMIC 33PF 10% 50V	
C208	1-101-004-00	CERAMIC 0.01MF 50V	
C209	1-101-004-00	CERAMIC 0.01MF 50V	
C210	1-101-004-00	CERAMIC 0.01MF 50V	
C211	1-101-004-00	CERAMIC 0.01MF 50V	
C212	1-101-004-00	CERAMIC 0.01MF 50V	
C213	1-101-004-00	CERAMIC 0.01MF 50V	
C214	1-101-004-00	CERAMIC 0.01MF 50V	
C215	1-101-004-00	CERAMIC 0.01MF 50V	
C216	1-101-004-00	CERAMIC 0.01MF 50V	
C217	1-101-004-00	CERAMIC 0.01MF 50V	
C301	1-101-888-00	CERAMIC 68PF 10% 50V	
C302	1-102-934-00	CERAMIC 1PF 0.5PF 50V	
C303	1-101-888-00	CERAMIC 68PF 10% 50V	
C304	1-102-934-00	CERAMIC 1PF 0.5PF 50V	
C305	1-102-978-00	CERAMIC 220PF 10% 50V	
C306	1-102-978-00	CERAMIC 220PF 10% 50V	
C307	1-102-963-00	CERAMIC 33PF 10% 50V	
C308	1-101-004-00	CERAMIC 0.01MF 50V	
C309	1-101-004-00	CERAMIC 0.01MF 50V	
C310	1-101-004-00	CERAMIC 0.01MF 50V	
C311	1-101-004-00	CERAMIC 0.01MF 50V	
C312	1-101-004-00	CERAMIC 0.01MF 50V	
C313	1-101-004-00	CERAMIC 0.01MF 50V	

Ref. No.	Part No.	Description				Remark
C314	1-101-004-00	CERAMIC	0.01MF		50V	
C315	1-101-004-00	CERAMIC	0.01MF		50V	
C316	1-101-004-00	CERAMIC	0.01MF		50V	
C317	1-101-004-00	CERAMIC	0.01MF		50V	
		<CONNECTOR>				
CON1	*1-562-729-11	CONNECTOR, MULTI 64P				
		<DIODE>				
D1	8-719-911-19	DIODE 1SS119				
D2	8-719-911-19	DIODE 1SS119				
D3	8-719-911-19	DIODE 1SS119				
D4	8-719-911-19	DIODE 1SS119				
D5	8-719-911-19	DIODE 1SS119				
		<IC>				
IC1	8-759-032-74	IC MC74HC00AN				
IC2	8-759-921-19	IC SN74HC161N				
IC3	8-759-921-19	IC SN74HC161N				
IC4	8-759-921-19	IC SN74HC161N				
IC5	8-759-921-19	IC SN74HC161N				
IC6	8-759-006-22	IC SN74LS283N				
IC7	8-759-006-22	IC SN74LS283N				
IC8	8-759-908-00	IC DAC08HQ				
IC9	8-759-910-83	IC TL072ACP				
IC10	8-759-982-07	IC RC7808FA				
IC11	8-759-701-86	IC UPC7908H				
IC12	8-759-917-05	IC SN74HC541N				
IC13	8-759-400-29	IC AN78L04				
	*1-526-659-00	IC SOCKET, IC (DP) 28P; IC101				
IC102	8-759-037-99	IC MC74HC574N				
IC103	8-759-037-99	IC MC74HC574N				
IC104	8-759-037-99	IC MC74HC574N				
IC105	8-759-908-00	IC DAC08HQ				
IC106	8-759-908-00	IC DAC08HQ				
IC107	8-759-903-16	IC LM318P				
	*1-526-659-00	IC SOCKET, IC (DP) 28P; IC201				
IC202	8-759-037-99	IC MC74HC574N				
IC203	8-759-037-99	IC MC74HC574N				
IC204	8-759-037-99	IC MC74HC574N				
IC205	8-759-908-00	IC DAC08HQ				
IC206	8-759-908-00	IC DAC08HQ				
IC207	8-759-903-16	IC LM318P				
	*1-526-659-00	IC SOCKET, IC (DP) 28P; IC301				
IC302	8-759-037-99	IC MC74HC574N				
IC303	8-759-037-99	IC MC74HC574N				
IC304	8-759-037-99	IC MC74HC574N				
IC305	8-759-908-00	IC DAC08HQ				
IC306	8-759-908-00	IC DAC08HQ				
IC307	8-759-903-16	IC LM318P				
		<RESISTOR>				
R1	1-215-421-00	METAL	1K	1%	1/6W	
R2	1-215-421-00	METAL	1K	1%	1/6W	
R3	1-215-397-00	METAL	100	1%	1/6W	
R4	1-215-409-00	METAL	330	1%	1/6W	
R6	1-215-427-00	METAL	1.8K	1%	1/6W	
R7	1-215-421-00	METAL	1K	1%	1/6W	
R8	1-215-421-00	METAL	1K	1%	1/6W	
R9	1-215-421-00	METAL	1K	1%	1/6W	
R10	1-215-421-00	METAL	1K	1%	1/6W	
R11	1-215-421-00	METAL	1K	1%	1/6W	
R12	1-215-421-00	METAL	1K	1%	1/6W	
R13	1-215-421-00	METAL	1K	1%	1/6W	
R14	1-215-445-00	METAL	10K	1%	1/6W	
R15	1-215-437-00	METAL	4.7K	1%	1/6W	
R16	1-215-437-00	METAL	4.7K	1%	1/6W	
R17	1-215-437-00	METAL	4.7K	1%	1/6W	
R101	1-215-421-00	METAL	1K	1%	1/6W	
R102	1-215-421-00	METAL	1K	1%	1/6W	
R103	1-215-421-00	METAL	1K	1%	1/6W	
R104	1-215-421-00	METAL	1K	1%	1/6W	
R105	1-215-421-00	METAL	1K	1%	1/6W	
R106	1-215-421-00	METAL	1K	1%	1/6W	
R107	1-215-429-00	METAL	2.2K	1%	1/6W	
R108	1-215-429-00	METAL	2.2K	1%	1/6W	
R110	1-215-397-00	METAL	100	1%	1/6W	
R201	1-215-421-00	METAL	1K	1%	1/6W	
R202	1-215-421-00	METAL	1K	1%	1/6W	
R203	1-215-421-00	METAL	1K	1%	1/6W	
R204	1-215-421-00	METAL	1K	1%	1/6W	
R205	1-215-421-00	METAL	1K	1%	1/6W	
R206	1-215-421-00	METAL	1K	1%	1/6W	
R207	1-215-429-00	METAL	2.2K	1%	1/6W	
R208	1-215-429-00	METAL	2.2K	1%	1/6W	
R210	1-215-397-00	METAL	100	1%	1/6W	
R301	1-215-421-00	METAL	1K	1%	1/6W	
R302	1-215-421-00	METAL	1K	1%	1/6W	
R303	1-215-421-00	METAL	1K	1%	1/6W	
R304	1-215-421-00	METAL	1K	1%	1/6W	
R305	1-215-421-00	METAL	1K	1%	1/6W	
R306	1-215-421-00	METAL	1K	1%	1/6W	
R307	1-215-429-00	METAL	2.2K	1%	1/6W	
R308	1-215-429-00	METAL	2.2K	1%	1/6W	
R310	1-215-397-00	METAL	100	1%	1/6W	
		<VARIABLE RESISTOR>				
RV1	1-237-515-21	RES, ADJ, CERMET 1K				
RV2	1-237-515-21	RES, ADJ, CERMET 1K				
		<SWITCH>				
SW1	1-554-027-00	SWITCH, ROTARY				
**********						
	*A-1394-142-A	ZA BOARD, COMPLETE				
		**********				
	*4-353-708-00	HOOK, FINGER				
	4-378-915-01	NUT (M2.6), PLATE				
		<CAPACITOR>				
C1	1-126-177-11	ELECT	100MF	20%	6.3V	
C2	1-126-177-11	ELECT	100MF	20%	6.3V	
C3	1-124-589-11	ELECT	47MF	20%	16V	
C4	1-124-589-11	ELECT	47MF	20%	16V	
C5	1-124-589-11	ELECT	47MF	20%	16V	
C6	1-124-589-11	ELECT	47MF	20%	16V	

ZA

Ref. No.	Part No.	Description			Remark
C7	1-101-004-00	CERAMIC	0.01MF	50V	
C8	1-101-004-00	CERAMIC	0.01MF	50V	
C9	1-131-365-00	TANTALUM	10MF	10% 16V	
C10	1-101-004-00	CERAMIC	0.01MF	50V	
C11	1-101-004-00	CERAMIC	0.01MF	50V	
C12	1-131-365-00	TANTALUM	10MF	10% 16V	
C13	1-102-973-00	CERAMIC	100PF	10% 50V	
C14	1-102-980-00	CERAMIC	270PF	5% 50V	
C20	1-101-001-00	CERAMIC	0.001MF	50V	
C21	1-101-001-00	CERAMIC	0.001MF	50V	
C22	1-101-001-00	CERAMIC	0.001MF	50V	
C23	1-101-001-00	CERAMIC	0.001MF	50V	
C24	1-101-001-00	CERAMIC	0.001MF	50V	
C25	1-101-001-00	CERAMIC	0.001MF	50V	
C26	1-101-001-00	CERAMIC	0.001MF	50V	
C27	1-101-001-00	CERAMIC	0.001MF	50V	
C28	1-101-001-00	CERAMIC	0.001MF	50V	
C29	1-101-001-00	CERAMIC	0.001MF	50V	
C30	1-101-001-00	CERAMIC	0.001MF	50V	
C31	1-101-001-00	CERAMIC	0.001MF	50V	
C34	1-101-001-00	CERAMIC	0.001MF	50V	
C35	1-101-001-00	CERAMIC	0.001MF	50V	
C50	1-101-004-00	CERAMIC	0.01MF	50V	
C51	1-101-004-00	CERAMIC	0.01MF	50V	
C52	1-101-004-00	CERAMIC	0.01MF	50V	
C53	1-101-004-00	CERAMIC	0.01MF	50V	
C54	1-101-004-00	CERAMIC	0.01MF	50V	
C55	1-101-004-00	CERAMIC	0.01MF	50V	
C56	1-101-004-00	CERAMIC	0.01MF	50V	
C57	1-101-004-00	CERAMIC	0.01MF	50V	
C58	1-101-004-00	CERAMIC	0.01MF	50V	
C59	1-101-004-00	CERAMIC	0.01MF	50V	
C60	1-101-004-00	CERAMIC	0.01MF	50V	
C61	1-101-004-00	CERAMIC	0.01MF	50V	
C62	1-101-004-00	CERAMIC	0.01MF	50V	
C63	1-101-004-00	CERAMIC	0.01MF	50V	
C64	1-101-004-00	CERAMIC	0.01MF	50V	
C65	1-101-004-00	CERAMIC	0.01MF	50V	
C66	1-101-004-00	CERAMIC	0.01MF	50V	
C67	1-101-004-00	CERAMIC	0.01MF	50V	
C68	1-101-004-00	CERAMIC	0.01MF	50V	
C69	1-101-004-00	CERAMIC	0.01MF	50V	
C70	1-101-004-00	CERAMIC	0.01MF	50V	
C71	1-101-004-00	CERAMIC	0.01MF	50V	
C72	1-101-004-00	CERAMIC	0.01MF	50V	
C78	1-101-004-00	CERAMIC	0.01MF	50V	
C79	1-101-004-00	CERAMIC	0.01MF	50V	
C80	1-101-004-00	CERAMIC	0.01MF	50V	
C81	1-101-004-00	CERAMIC	0.01MF	50V	
C82	1-101-004-00	CERAMIC	0.01MF	50V	
C83	1-101-004-00	CERAMIC	0.01MF	50V	
C84	1-101-004-00	CERAMIC	0.01MF	50V	
C85	1-101-004-00	CERAMIC	0.01MF	50V	
C86	1-101-004-00	CERAMIC	0.01MF	50V	

<IC>

IC1	8-759-903-93	IC SN74LS393N
IC2	8-759-900-00	IC SN74LS00N
IC3	8-759-900-00	IC SN74LS00N
IC4	8-759-900-08	IC SN74LS08N
IC5	8-759-900-00	IC SN74LS00N
IC6	8-759-900-14	IC SN74LS14N
IC7	8-759-903-93	IC SN74LS393N
IC8	8-759-773-14	IC TBP28L42N-CURSB
	*1-526-656-00	SOCKET, IC (DP) 20P
IC9	8-759-902-73	IC SN74LS273N
IC10	8-759-901-51	IC SN74LS151N
IC11	8-759-900-00	IC SN74LS00N
IC12	8-759-989-69	IC SN74LS86AN
IC13	8-759-903-93	IC SN74LS393N
IC14	8-759-988-76	IC MB7116H-K-DLYD
	*1-526-654-00	SOCKET, IC (DP) 16P
IC15	8-759-900-74	IC SN74LS74AN
IC16	8-759-903-93	IC SN74LS393N
IC17	8-759-773-14	IC TBP28L42N-CURSB
	*1-526-656-00	SOCKET, IC (DP) 20P
IC18	8-759-902-73	IC SN74LS273N
IC19	8-759-901-51	IC SN74LS151N
IC20	8-759-901-38	IC SN74LS138N
IC21	8-759-901-38	IC SN74LS138N
IC22	8-759-502-77	IC SN74LS139AN
IC23	8-759-902-44	IC SN74LS244N
IC24	8-759-902-73	IC SN74LS273N
IC25	8-759-902-73	IC SN74LS273N
IC26	8-759-902-73	IC SN74LS273N
IC27	8-759-902-73	IC SN74LS273N
IC28	8-759-901-38	IC SN74LS138N
IC29	8-749-900-14	IC CP2005S
IC30	8-749-900-14	IC CP2005S
IC31	8-749-900-14	IC CP2005S
IC32	8-749-900-14	IC CP2005S
IC33	8-749-900-14	IC CP2005S
IC34	8-749-900-14	IC CP2005S
IC36	8-749-900-14	IC CP2005S
IC37	8-759-145-57	IC UPC4557
IC38	8-759-145-57	IC UPC4557
IC39	8-759-145-57	IC UPC4557
IC40	8-759-145-57	IC UPC4557
IC41	8-759-145-57	IC UPC4557
IC42	8-759-145-57	IC UPC4557
IC44	8-759-145-57	IC UPC4557
IC45	8-759-107-33	IC UPC1060
IC46	8-759-107-33	IC UPC1060

<COIL>

L1	1-409-309-00	COIL, SN 72UH

<TRANSISTOR>

Q3	8-729-900-36	TRANSISTOR DTC124ES
Q4	8-729-900-36	TRANSISTOR DTC124ES

<RESISTOR>

R1	1-249-405-11	CARBON	100	5%	1/4W
R2	1-249-406-11	CARBON	120	5%	1/4W
R3	1-247-848-11	CARBON	5.1K	5%	1/4W
R4	1-247-848-11	CARBON	5.1K	5%	1/4W
R5	1-215-432-00	METAL	3K	1%	1/6W
R6	1-215-432-00	METAL	3K	1%	1/6W
R7	1-215-432-00	METAL	3K	1%	1/6W
R8	1-215-432-00	METAL	3K	1%	1/6W

Ref. No.	Part No.	Description				Remark
R9	1-215-432-00	METAL	3K	1%	1/6W	
R10	1-215-432-00	METAL	3K	1%	1/6W	
R11	1-215-432-00	METAL	3K	1%	1/6W	
R12	1-215-432-00	METAL	3K	1%	1/6W	
R13	1-215-432-00	METAL	3K	1%	1/6W	
R14	1-215-432-00	METAL	3K	1%	1/6W	
R15	1-215-432-00	METAL	3K	1%	1/6W	
R16	1-215-432-00	METAL	3K	1%	1/6W	
R19	1-215-432-00	METAL	3K	1%	1/6W	
R20	1-215-432-00	METAL	3K	1%	1/6W	
R21	1-249-405-11	CARBON	100	5%	1/4W	
R22	1-215-447-00	METAL	12K	1%	1/6W	
R23	1-215-447-00	METAL	12K	1%	1/6W	
R24	1-249-405-11	CARBON	100	5%	1/4W	
R25	1-215-447-00	METAL	12K	1%	1/6W	
R26	1-215-447-00	METAL	12K	1%	1/6W	
R27	1-249-405-11	CARBON	100	5%	1/4W	
R28	1-215-447-00	METAL	12K	1%	1/6W	
R29	1-215-447-00	METAL	12K	1%	1/6W	
R30	1-249-405-11	CARBON	100	5%	1/4W	
R31	1-215-447-00	METAL	12K	1%	1/6W	
R32	1-215-447-00	METAL	12K	1%	1/6W	
R33	1-249-405-11	CARBON	100	5%	1/4W	
R34	1-215-447-00	METAL	12K	1%	1/6W	
R35	1-215-447-00	METAL	12K	1%	1/6W	
R36	1-249-405-11	CARBON	100	5%	1/4W	
R37	1-215-447-00	METAL	12K	1%	1/6W	
R38	1-215-447-00	METAL	12K	1%	1/6W	
R39	1-215-397-00	METAL	100	1%	1/6W	
R40	1-215-447-00	METAL	12K	1%	1/6W	
R41	1-215-447-00	METAL	12K	1%	1/6W	
R42	1-215-455-00	METAL	27K	1%	1/6W	
R43	1-215-447-00	METAL	12K	1%	1/6W	
R44	1-215-447-00	METAL	12K	1%	1/6W	
R45	1-215-397-00	METAL	100	1%	1/6W	
R46	1-215-447-00	METAL	12K	1%	1/6W	
R47	1-215-447-00	METAL	12K	1%	1/6W	
R48	1-215-455-00	METAL	27K	1%	1/6W	
R49	1-215-447-00	METAL	12K	1%	1/6W	
R50	1-215-447-00	METAL	12K	1%	1/6W	
R51	1-215-397-00	METAL	100	1%	1/6W	
R52	1-215-447-00	METAL	12K	1%	1/6W	
R53	1-215-447-00	METAL	12K	1%	1/6W	
R54	1-215-455-00	METAL	27K	1%	1/6W	
R55	1-215-447-00	METAL	12K	1%	1/6W	
R56	1-215-447-00	METAL	12K	1%	1/6W	
R63	1-249-405-11	CARBON	100	5%	1/4W	
R64	1-215-447-00	METAL	12K	1%	1/6W	
R65	1-215-447-00	METAL	12K	1%	1/6W	
R67	1-215-447-00	METAL	12K	1%	1/6W	
R68	1-215-447-00	METAL	12K	1%	1/6W	
		<RESISTOR BLOCK>				
RB1	1-231-408-00	RESISTOR BLOCK 5.1K				
RB2	1-231-408-00	RESISTOR BLOCK 5.1K				
		<CONNECTOR>				
ZA1	*1-562-729-11	CONNECTOR, MULTI 64P				
**********						
	*A-1394-143-A	ZC BOARD, COMPLETE				
		**********				
	*4-353-708-00	HOOK, FINGER				
	4-378-915-01	NUT (M2.6), PLATE				
		<CAPACITOR>				
C1	1-126-177-11	ELECT	100MF	20%	6.3V	
C2	1-126-177-11	ELECT	100MF	20%	6.3V	
C4	1-124-589-11	ELECT	47MF	20%	16V	
C5	1-124-589-11	ELECT	47MF	20%	16V	
C6	1-126-157-11	ELECT	10MF	20%	16V	
C7	1-102-973-00	CERAMIC	100PF	5%	50V	
C8	1-101-004-00	CERAMIC	0.01MF		50V	
C9	1-101-004-00	CERAMIC	0.01MF		50V	
C10	1-101-004-00	CERAMIC	0.01MF		50V	
C11	1-101-004-00	CERAMIC	0.01MF		50V	
C12	1-101-004-00	CERAMIC	0.01MF		50V	
C13	1-101-004-00	CERAMIC	0.01MF		50V	
C14	1-101-004-00	CERAMIC	0.01MF		50V	
C15	1-101-004-00	CERAMIC	0.01MF		50V	
C16	1-101-004-00	CERAMIC	0.01MF		50V	
C17	1-101-004-00	CERAMIC	0.01MF		50V	
C18	1-101-004-00	CERAMIC	0.01MF		50V	
C19	1-101-004-00	CERAMIC	0.01MF		50V	
C20	1-101-004-00	CERAMIC	0.01MF		50V	
C21	1-101-004-00	CERAMIC	0.01MF		50V	
C22	1-101-004-00	CERAMIC	0.01MF		50V	
C23	1-102-961-00	CERAMIC	27PF	5%	50V	
C24	1-101-004-00	CERAMIC	0.01MF		50V	
C25	1-101-004-00	CERAMIC	0.01MF		50V	
C26	1-101-004-00	CERAMIC	0.01MF		50V	
C27	1-101-004-00	CERAMIC	0.01MF		50V	
		<DIODE>				
D1	8-719-911-19	DIODE 1SS119				
D2	8-719-911-19	DIODE 1SS119				
D3	8-719-911-19	DIODE 1SS119				
D4	8-719-800-60	DIODE TLR214				
D5	8-719-800-60	DIODE TLR214				
D6	8-719-800-60	DIODE TLR214				
		<IC>				
IC1	8-759-900-14	IC SN74LS14N				
IC2	8-759-900-32	IC SN74LS32N				
IC3	8-759-916-80	IC LH0080A				
	*1-526-662-21	SOCKET, IC (DP) 40P				
IC4	8-759-994-98	IC MBM2764-K-HDMH2.3				
	*1-526-659-00	SOCKET, IC (DP) 28P				
IC5	8-752-321-00	IC CXK5816PN-12L				
	*1-526-658-21	SOCKET, IC (DP) 24P				
IC6	8-759-748-33	IC HN58C65P-25				
	*1-526-659-00	SOCKET, IC (DP) 28P				
IC7	8-759-902-44	IC SN74LS244N				
IC8	8-759-902-44	IC SN74LS244N				
IC9	8-759-906-45	IC SN74LS645N				
IC10	8-759-910-04	IC SN74S04N				
IC11	8-759-903-93	IC SN74LS393N				

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Ref. No.	Part No.	Description	Remark
IC12	8-759-926-31	IC AM26LS31P	
	*1-526-654-00	SOCKET, IC (DP) 16P	
IC13	8-759-926-32	IC AM26LS32P	
	*1-526-654-00	SOCKET, IC (DP) 16P	
IC14	8-759-916-84	IC LH0084A	
	*1-526-662-21	SOCKET, IC (DP) 40P	
IC15	8-759-916-82	IC LH0082AD	
	*1-526-659-00	SOCKET, IC (DP) 28P	
IC16	8-759-502-77	IC SN74LS139AN	
IC17	8-759-901-38	IC SN74LS138N	
IC18	8-759-901-38	IC SN74LS138N	
IC19	8-759-900-04	IC SN74LS04N	
IC20	8-759-900-32	IC SN74LS32N	
IC21	8-759-900-02	IC SN74LS02N	
IC22	8-759-900-32	IC SN74LS32N	
IC23	8-759-903-77	IC SN74LS377N	
IC24	8-759-903-77	IC SN74LS377N	
IC25	8-759-902-40	IC SN74LS240N	
IC26	8-759-645-19	IC M54519P	
	*1-526-654-00	SOCKET, IC (DP) 16P	
IC27	8-759-645-19	IC M54519P	
	*1-526-654-00	SOCKET, IC (DP) 16P	
		<COIL>	
L1	1-409-309-00	COIL, SN 72UH	
		<TRANSISTOR>	
Q1	8-729-173-38	TRANSISTOR 2SA733-K	
Q2	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q3	8-729-173-38	TRANSISTOR 2SA733-K	
		<RESISTOR>	
R1	1-249-437-11	CARBON 47K 5% 1/4W	
R2	1-249-437-11	CARBON 47K 5% 1/4W	
R3	1-249-413-11	CARBON 470 5% 1/4W	
R4	1-249-411-11	CARBON 330 5% 1/4W	
R5	1-249-411-11	CARBON 330 5% 1/4W	
R6	1-249-405-11	CARBON 100 5% 1/4W	
R7	1-249-411-11	CARBON 330 5% 1/4W	
R8	1-249-429-11	CARBON 10K 5% 1/4W	
R9	1-249-429-11	CARBON 10K 5% 1/4W	
R10	1-249-429-11	CARBON 10K 5% 1/4W	
R11	1-249-429-11	CARBON 10K 5% 1/4W	
R12	1-249-409-11	CARBON 220 5% 1/4W	
R13	1-249-420-11	CARBON 1.8K 5% 1/4W	
R14	1-249-405-11	CARBON 100 5% 1/4W	
R15	1-249-442-11	CARBON 510 5% 1/4W	
R16	1-249-417-11	CARBON 1K 5% 1/4W	
R17	1-247-814-11	CARBON 200 5% 1/4W	
R18	1-249-397-11	CARBON 22 5% 1/4W	
R19	1-249-397-11	CARBON 22 5% 1/4W	
R20	1-249-405-11	CARBON 100 5% 1/4W	
R21	1-249-437-11	CARBON 47K 5% 1/4W	
R22	1-249-405-11	CARBON 100 5% 1/4W	
R23	1-249-401-11	CARBON 47 5% 1/4W	
R24	1-249-401-11	CARBON 47 5% 1/4W	
R25	1-249-425-11	CARBON 4.7K 5% 1/4W	
R26	1-249-401-11	CARBON 47 5% 1/4W	
R27	1-249-437-11	CARBON 47K 5% 1/4W	
R28	1-249-401-11	CARBON 47 5% 1/4W	
R29	1-249-401-11	CARBON 47 5% 1/4W	
R30	1-249-401-11	CARBON 47 5% 1/4W	
R31	1-249-405-11	CARBON 100 5% 1/4W	
R32	1-249-405-11	CARBON 100 5% 1/4W	
R33	1-249-405-11	CARBON 100 5% 1/4W	
R34	1-249-393-11	CARBON 10 5% 1/4W	
R35	1-249-405-11	CARBON 100 5% 1/4W	
R36	1-249-405-11	CARBON 100 5% 1/4W	
R37	1-249-417-11	CARBON 1K 5% 1/4W	
R38	1-249-417-11	CARBON 1K 5% 1/4W	
R39	1-249-417-11	CARBON 1K 5% 1/4W	
		<RESISTOR BLOCK>	
RB1	1-231-410-00	RESISTOR BLOCK 10K	
RB2	1-231-410-00	RESISTOR BLOCK 10K	
RB3	1-231-410-00	RESISTOR BLOCK 10K	
RB4	1-231-410-00	RESISTOR BLOCK 10K	
		<SWITCH>	
SW1	1-554-303-21	SWITCH, KEY BOARD	
SW2	1-554-303-21	SWITCH, KEY BOARD	
		<CRYSTAL>	
X1	1-527-827-00	OSCILLATOR, CRYSTAL	
		<CONNECTOR>	
ZC1	*1-562-729-11	CONNECTOR, MULTI 64P	
ZC2	*1-561-724-00	SOCKET, CONNECTOR 2P	
ZC2	*1-564-431-11	POST, CONNECTOR 3P	
**********			
	*A-1394-168-A	ZD BOARD, COMPLETE	
		**********	
	*1-528-166-11	BATTERY, LITHIUM (BUTTON TYPE)	
	*1-561-724-00	SOCKET, CONNECTOR 2P	
	3-618-225-00	NUT, PLATE	
	*4-353-708-00	HOOK, FINGER	
	4-378-915-01	NUT (M2.6), PLATE	
	4-812-134-11	RIVET NYLON, 3.5 PHI	
		<CAPACITOR>	
C1	1-126-177-11	ELECT 100MF 20% 6.3V	
C2	1-101-004-00	CERAMIC 0.01MF 50V	
C3	1-126-177-11	ELECT 100MF 20% 6.3V	
C4	1-101-001-00	CERAMIC 0.001MF 50V	
C5	1-131-353-00	TANTALUM 10MF 10% 35V	
C6	1-101-004-00	CERAMIC 0.01MF 50V	
C7	1-101-004-00	CERAMIC 0.01MF 50V	
C8	1-124-598-11	ELECT 22MF 20% 25V	
C9	1-101-004-00	CERAMIC 0.01MF 50V	
C10	1-124-598-11	ELECT 22MF 20% 25V	
C11	1-101-004-00	CERAMIC 0.01MF 50V	
C12	1-131-353-00	TANTALUM 10MF 10% 35V	
C13	1-101-004-00	CERAMIC 0.01MF 50V	
C14	1-131-353-00	TANTALUM 10MF 10% 35V	
C15	1-101-004-00	CERAMIC 0.01MF 50V	

Ref. No.	Part No.	Description			Remark
C16	1-101-004-00	CERAMIC	0.01MF	50V	
C17	1-101-004-00	CERAMIC	0.01MF	50V	
C18	1-101-004-00	CERAMIC	0.01MF	50V	
C19	1-101-004-00	CERAMIC	0.01MF	50V	
C20	1-101-004-00	CERAMIC	0.01MF	50V	
C21	1-126-177-11	ELECT	100MF 20%	6.3V	
C22	1-101-004-00	CERAMIC	0.01MF	50V	
C23	1-131-353-00	TANTALUM	10MF 10%	35V	
C24	1-101-004-00	CERAMIC	0.01MF	50V	
C25	1-131-353-00	TANTALUM	10MF 10%	35V	
C26	1-131-353-00	TANTALUM	10MF 10%	35V	
C27	1-102-980-00	CERAMIC	270PF 5%	50V	
C28	1-131-353-00	TANTALUM	10MF 10%	35V	
C29	1-102-980-00	CERAMIC	270PF 5%	50V	
C30	1-102-980-00	CERAMIC	270PF 5%	50V	
C31	1-101-004-00	CERAMIC	0.01MF	50V	
C32	1-101-004-00	CERAMIC	0.01MF	50V	
C33	1-131-353-00	TANTALUM	10MF 10%	35V	
C34	1-102-980-00	CERAMIC	270PF 5%	50V	
C35	1-131-353-00	TANTALUM	10MF 10%	35V	
C36	1-101-004-00	CERAMIC	0.01MF	50V	
C37	1-101-004-00	CERAMIC	0.01MF	50V	
C38	1-101-004-00	CERAMIC	0.01MF	50V	
C39	1-101-004-00	CERAMIC	0.01MF	50V	
C40	1-101-004-00	CERAMIC	0.01MF	50V	
C41	1-101-004-00	CERAMIC	0.01MF	50V	
C42	1-102-980-00	CERAMIC	270PF 5%	50V	
C43	1-131-353-00	TANTALUM	10MF 10%	35V	
C44	1-101-004-00	CERAMIC	0.01MF	50V	
C45	1-101-001-00	CERAMIC	0.001MF	50V	
C46	1-101-001-00	CERAMIC	0.001MF	50V	
C47	1-101-001-00	CERAMIC	0.001MF	50V	
C48	1-101-001-00	CERAMIC	0.001MF	50V	
		<DIODE>			
D1	8-719-981-01	DIODE ERA81-004			
D2	8-719-911-19	DIODE 1SS119			
D3	8-719-911-19	DIODE 1SS119			
D4	8-719-911-19	DIODE 1SS119			
		<IC>			
IC1	8-759-741-13	IC TBP28L42N-VAE			
	*1-526-656-00	SOCKET, IC (DP) 20P			
IC2	8-759-916-79	IC SN74HC273N			
	*1-526-656-00	SOCKET, IC (DP) 20P			
IC3	8-759-109-88	IC UPC624			
IC4	8-759-107-33	IC UPC1060			
IC5	8-759-990-82	IC TL082CP			
IC6	8-759-917-11	IC SN74HC393N			
IC7	8-759-233-05	IC SN74HC283AP			
IC8	8-759-916-71	IC SN74HC244N			
IC9	8-759-032-79	IC MC74HC14AN			
IC10	8-759-741-14	IC TBP28L42N-HAE			
	*1-526-656-00	SOCKET, IC (DP) 20P			
IC11	8-759-916-96	IC SN74HC374N			
IC12	8-759-032-85	IC MC74HC138AN			
IC13	8-752-331-06	IC CXK5864BP-10L			
	*1-526-659-00	SOCKET, IC (DP) 28P			
IC14	8-759-916-71	IC SN74HC244N			
IC15	8-759-989-73	IC SN74LS257-BN			
IC16	8-759-974-70	IC SN7470N			
IC17	8-759-916-25	IC SN74HC32N			
IC18	8-759-906-45	IC SN74LS645N			
IC19	8-759-916-96	IC SN74HC374N			
IC20	8-759-916-96	IC SN74HC374N			
IC21	8-759-916-96	IC SN74HC374N			
IC22	8-759-916-96	IC SN74HC374N			
IC23	8-759-916-96	IC SN74HC374N			
IC24	8-759-916-96	IC SN74HC374N			
IC25	8-759-916-96	IC SN74HC374N			
IC26	8-759-916-96	IC SN74HC374N			
IC27	8-749-900-14	IC CP2005S			
IC28	8-749-900-14	IC CP2005S			
IC29	8-749-900-14	IC CP2005S			
IC30	8-749-900-14	IC CP2005S			
IC31	8-759-990-82	IC TL082CP			
IC32	8-759-990-82	IC TL082CP			
IC33	8-759-701-86	IC NJM7908FA			
IC34	8-759-982-07	IC RC7808FA			
IC35	8-759-982-21	IC RC78L05A			
		<COIL>			
L1	1-409-309-00	COIL, SN 72UH			
		<RESISTOR>			
R1	1-249-425-11	CARBON	4.7K 5%	1/4W	
R2	1-249-425-11	CARBON	4.7K 5%	1/4W	
R3	1-215-423-00	METAL	1.2K 1%	1/6W	
R4	1-215-423-00	METAL	1.2K 1%	1/6W	
R5	1-215-423-00	METAL	1.2K 1%	1/6W	
R6	1-215-423-00	METAL	1.2K 1%	1/6W	
R7	1-249-405-11	CARBON	100 5%	1/4W	
R8	1-249-411-11	CARBON	330 5%	1/4W	
R9	1-249-411-11	CARBON	330 5%	1/4W	
R10	1-249-411-11	CARBON	330 5%	1/4W	
R11	1-249-411-11	CARBON	330 5%	1/4W	
R12	1-249-429-11	CARBON	10K 5%	1/4W	
R13	1-249-429-11	CARBON	10K 5%	1/4W	
R14	1-215-433-00	METAL	3.3K 1%	1/6W	
R15	1-215-433-00	METAL	3.3K 1%	1/6W	
R16	1-215-433-00	METAL	3.3K 1%	1/6W	
R17	1-249-429-11	CARBON	10K 5%	1/4W	
R18	1-249-429-11	CARBON	10K 5%	1/4W	
R19	1-249-429-11	CARBON	10K 5%	1/4W	
R20	1-215-433-00	METAL	3.3K 1%	1/6W	
R21	1-215-433-00	METAL	3.3K 1%	1/6W	
R22	1-215-433-00	METAL	3.3K 1%	1/6W	
R23	1-215-433-00	METAL	3.3K 1%	1/6W	
R24	1-215-433-00	METAL	3.3K 1%	1/6W	
R25	1-215-433-00	METAL	3.3K 1%	1/6W	
R26	1-215-433-00	METAL	3.3K 1%	1/6W	
R27	1-215-433-00	METAL	3.3K 1%	1/6W	
R28	1-215-433-00	METAL	3.3K 1%	1/6W	
R29	1-215-433-00	METAL	3.3K 1%	1/6W	
R30	1-215-433-00	METAL	3.3K 1%	1/6W	
R31	1-215-433-00	METAL	3.3K 1%	1/6W	
R32	1-215-433-00	METAL	3.3K 1%	1/6W	
R33	1-249-429-11	CARBON	10K 5%	1/4W	
R34	1-249-441-11	CARBON	100K 5%	1/4W	
R35	1-249-399-11	CARBON	33 5%	1/4W	

ZN **N**

Ref. No.	Part No.	Description			Remark
		<RESISTOR BLOCK>			
RB1	1-231-410-00	RESISTOR BLOCK 10K			
RB2	1-231-410-00	RESISTOR BLOCK 10K			
		<CONNECTOR>			
ZD1	*1-562-729-11	CONNECTOR, MULTI 64P			
ZD2	*1-564-431-11	POST, CONNECTOR 3P			
**********					
	*A-1394-176-A	N BOARD, COMPLETE			
		**********			
	*1-563-673-11	CONNECTOR 14P			
	1-807-662-11	LIQUID CRYSTAL MODULE			
	4-383-316-01	KNOB (B), VOL			
	*4-384-616-01	SPACER (B)			
		<CAPACITOR>			
C2	1-131-382-00	TANTALUM	6.8MF	10% 6.3V	
C4	1-136-157-00	FILM	0.022MF	5% 50V	
C5	1-126-177-11	ELECT	100MF	20% 6.3V	
C7	1-101-004-00	CERAMIC	0.01MF	50V	
C9	1-101-004-00	CERAMIC	0.01MF	50V	
C10	1-101-004-00	CERAMIC	0.01MF	50V	
C12	1-101-004-00	CERAMIC	0.01MF	50V	
C13	1-101-004-00	CERAMIC	0.01MF	50V	
C14	1-101-004-00	CERAMIC	0.01MF	50V	
C15	1-102-947-00	CERAMIC	10PF	0.5PF 50V	
C16	1-102-947-00	CERAMIC	10PF	0.5PF 50V	
C17	1-101-004-00	CERAMIC	0.01MF	50V	
C18	1-131-365-00	TANTALUM	10MF	10% 16V	
C19	1-101-004-00	CERAMIC	0.01MF	50V	
C20	1-126-157-11	ELECT	10MF	20% 16V	
C21	1-124-589-11	ELECT	47MF	20% 16V	
C22	1-131-365-00	TANTALUM	10MF	10% 16V	
		<RESISTOR BLOCK>			
CP1	1-231-410-00	RESISTOR BLOCK 10K			
		<DIODE>			
D4	8-719-911-19	DIODE 1SS119			
D5	8-719-911-19	DIODE 1SS119			
D6	8-719-911-19	DIODE 1SS119			
D7	8-719-911-19	DIODE 1SS119			
D8	8-719-911-19	DIODE 1SS119			
D9	8-719-911-19	DIODE 1SS119			
D10	8-719-911-19	DIODE 1SS119			
D11	8-719-911-19	DIODE 1SS119			
D12	8-719-911-19	DIODE 1SS119			
D13	8-719-911-19	DIODE 1SS119			
D14	8-719-911-19	DIODE 1SS119			
D15	8-719-911-19	DIODE 1SS119			
D16	8-719-911-19	DIODE 1SS119			
D17	8-719-911-19	DIODE 1SS119			
D18	8-719-911-19	DIODE 1SS119			
D19	8-719-911-19	DIODE 1SS119			
D20	8-719-911-19	DIODE 1SS119			
D23	8-719-939-59	DIODE SLP273B-01			
D24	8-719-939-59	DIODE SLP273B-01			
D25	8-719-939-59	DIODE SLP273B-01			
D26	8-719-903-17	DIODE SLP271E			
D27	8-719-903-17	DIODE SLP271E			
D28	8-719-911-19	DIODE 1SS119			
D29	8-719-911-19	DIODE 1SS119			
		<IC>			
IC2	8-759-916-46	IC SN74HC139N			
IC3	8-759-994-97	IC MBM27C256A-K-HDMC3.2			
	*1-526-659-00	SOCKET, IC (DP) 28P			
IC4	8-759-916-94	IC SN74HC373N			
IC5	8-759-103-91	IC UPD7810G			
IC6	8-759-951-58	IC SN75158P			
IC7	8-759-926-32	IC AM26LS32P			
IC8	8-759-645-19	IC M54519P			
IC9	8-759-032-79	IC MC74HC14AN			
		<CONNECTOR>			
N1	*1-563-732-11	SOCKET, ROUND TYPE 8P			
N2	*1-566-054-11	PIN, CONNECTOR 2P			
N3	*1-564-862-11	PIN, CONNECTOR (STRAIGHT) 14P			
N4	*1-566-054-11	PIN, CONNECTOR 2P			
N5	*1-566-054-11	PIN, CONNECTOR 2P			
N6	*1-566-056-11	PIN, CONNECTOR 4P			
N7	*1-566-056-11	PIN, CONNECTOR 4P			
		<TRANSISTOR>			
Q1	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q2	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q3	8-729-119-76	TRANSISTOR 2SA1175-HFE			
Q4	8-729-119-76	TRANSISTOR 2SA1175-HFE			
		<RESISTOR>			
R5	1-249-429-11	CARBON	10K	5% 1/4W	
R6	1-249-429-11	CARBON	10K	5% 1/4W	
R7	1-247-726-11	CARBON	33K	5% 1/4W	
R8	1-247-699-11	CARBON	82	5% 1/4W	
R11	1-249-429-11	CARBON	10K	5% 1/4W	
R12	1-249-401-11	CARBON	47	5% 1/4W	
R13	1-249-401-11	CARBON	47	5% 1/4W	
R14	1-249-429-11	CARBON	10K	5% 1/4W	
R15	1-249-401-11	CARBON	47	5% 1/4W	
R16	1-249-429-11	CARBON	10K	5% 1/4W	
R17	1-249-429-11	CARBON	10K	5% 1/4W	
R18	1-249-429-11	CARBON	10K	5% 1/4W	
R21	1-249-429-11	CARBON	10K	5% 1/4W	
R23	1-249-429-11	CARBON	10K	5% 1/4W	
R24	1-249-405-11	CARBON	100	5% 1/4W	
R25	1-249-429-11	CARBON	10K	5% 1/4W	
R26	1-249-429-11	CARBON	10K	5% 1/4W	
R27	1-249-420-11	CARBON	1.8K	5% 1/4W	
R30	1-249-429-11	CARBON	10K	5% 1/4W	
R33	1-249-401-11	CARBON	47	5% 1/4W	
R36	1-249-401-11	CARBON	47	5% 1/4W	
R37	1-249-425-11	CARBON	4.7K	5% 1/4W	
R38	1-249-401-11	CARBON	47	5% 1/4W	

The components identified by shading and mark ⚠ are critical for safety.
Replace only with part number specified.

Les composants identifies par une trame et une marque ⚠ sont critiques pour la securite.
Ne les remplacer que par une piece portant le numero specifie.

N

Ref. No.	Part No.	Description	Remark
R39	1-249-429-11	CARBON 10K 5% 1/4W	
R40	1-249-429-11	CARBON 10K 5% 1/4W	
R41	1-249-429-11	CARBON 10K 5% 1/4W	
R42	1-249-417-11	CARBON 1K 5% 1/4W	
R43	1-249-417-11	CARBON 1K 5% 1/4W	
R44	1-249-417-11	CARBON 1K 5% 1/4W	
		<VARIABLE RESISTOR>	
RV3	1-228-594-00	RES, VAR, CARBON 10K	
RV4	1-224-940-00	RES, ADJ, CERMET 10K (LCD CONTRAST)	
		<SWITCH>	
S2	1-570-101-41	SWITCH, KEY BOARD	
S3	1-570-101-41	SWITCH, KEY BOARD	
S4	1-570-101-41	SWITCH, KEY BOARD	
S5	1-570-101-41	SWITCH, KEY BOARD	
S6	1-570-101-41	SWITCH, KEY BOARD	
S7	1-570-101-41	SWITCH, KEY BOARD	
S8	1-570-101-41	SWITCH, KEY BOARD	
S9	1-570-101-41	SWITCH, KEY BOARD	
S10	1-570-101-41	SWITCH, KEY BOARD	
S11	1-570-101-41	SWITCH, KEY BOARD	
S12	1-570-101-41	SWITCH, KEY BOARD	
S13	1-570-101-41	SWITCH, KEY BOARD	
S14	1-570-101-41	SWITCH, KEY BOARD	
S15	1-570-101-41	SWITCH, KEY BOARD	
S16	1-570-101-41	SWITCH, KEY BOARD	
S17	1-570-101-41	SWITCH, KEY BOARD	
		<TRANSFORMER>	
T1	1-448-704-11	TRANSFORMER, CONVERTER	
		<CRYSTAL>	
X1	1-527-828-00	OSCILLATOR, CRYSTAL	

Ref. No.	Part No.	Description	Remark
		**********	
		MISCELLANEOUS	
		**********	
	⚠1-230-618-11	RESISTOR ASSY, HIGH-VOLTAGE	
	⚠1-413-227-11	SWITCHING REGULATOR (CR-15EN)	
	⚠1-413-251-11	SWITCHING REGULATOR (SF-11)	
	⚠1-413-287-11	REGULATOR, SWITCHING (TK-18)	
	1-426-292-11	COIL, LANDING CORRECTION (A)	
	1-426-293-11	COIL, LANDING CORRECTION (B)	
	1-452-032-00	MAGNET, DISK; 10 MM PHI	
	1-452-094-00	MAGNET, ROTATABLE; 15 MM PHI	
	⚠1-453-107-21	HIGH-VOLTAGE BLOCK (DCT BLOCK)	
	1-533-224-11	HOLDER, FUSE (DIA. 5.2)	
	*1-557-152-81	CABLE, PIN	
	*1-559-134-11	CONNECTOR ASSY	
CNP901	⚠1-560-222-11	INLET 3P	
F901	⚠1-532-350-11	FUSE, TIME-LAG 4A/250V (HDM-2830E ONLY)	
	⚠1-532-748-11	FUSE, GLASS TUBE 6.3A/125V (HDM-2830 ONLY)	
IC101	8-759-971-94	IC MBM27C256A-25CZ	
IC201	8-759-971-94	IC MBM27C256A-25CZ	
IC301	8-759-971-94	IC MBM27C256A-25CZ	
L901	⚠1-426-294-11	COIL, DEMAGNETIZATION	
L902	⚠1-451-326-11	DEFLECTION YOKE (Y41HDC)	
L903	⚠1-452-117-00	CRT NECK ASSY	
L904	⚠1-452-261-00	CRT NECK ASSY (362)	
S901	⚠1-571-877-11	SWITCH, PUSH (AC POWER) (1 KEY)	
S902	⚠1-570-173-21	SWITCH, VOLTAGE CHANGE	
T901	⚠1-439-381-21	TRANSFORMER ASSY, FLYBACK	
V901	⚠8-738-452-75	CRT SD-168(C)	
		**********	

4-390-486-11

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Display Products Group

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